COMMODORE

Disk User

MAY/JUNE 1988
£2.50

FOR C64 AND C128 USERS

IN THE MAGAZINE ▶▶

INSIDE BASIC
HEIGHT OF RESOLUTION
WHICH CARTRIDGE?
WAR GAMES FROM SSG

COMMODORE

Disk User

MAY/JUNE 1988
£2.50

FOR C64 AND C128 USERS

IN THE MAGAZINE ▶▶

INSIDE BASIC
HEIGHT OF RESOLUTION
WHICH CARTRIDGE?
WAR GAMES FROM SSG

COMMODORE

Disk User

MAY/JUNE 1988
£2.50

FOR C64 AND C128 USERS

IN THE MAGAZINE ▶▶

INSIDE BASIC
HEIGHT OF RESOLUTION
WHICH CARTRIDGE?
WAR GAMES FROM SSG

FREE

Deluxe 120 disk capacity lockable disk box worth over £14 . (Please state if you want the 100 capacity box instead).

SCHOOL & GOVT. ORDERS WELCOME.

When you buy 25 disks for only **£18.25**
or 50 disks for only **£27.50**
or 100 disks for only **£44.50**

All disks are Japanese Highgrade 5.25 DS/DD certified to 96 tpi. They come with hub rings, envelopes & labels, and a unique 5 year guarantee - Great Value!

FREE!
with every order. Our new 30 page catalogue crammed with offers on consumables, CBM Hardware and peripherals.
And amazing prices and deals on all the latest CBM software!
Catalogue available seperately 50p

ORDER BY PHONE FOR SAME DAY DESPATCH

Nebulae, Dept. CD FREEPOST, Kilroot Park Industrial Estate, Carrickfergus, Co. Antrim, BT38 7BR
Telephone (09603) 51020 (Monday to Friday 9 to 5)
7 Day delivery and 14 day money back period.
We accept orders from all government bodies, schools, universities, PLC's etc.

Tel: (09603) 51020

FREEPOST YOUR ORDER TODAY - NO STAMP REQUIRED

SSG

STATEGIC STUDIES GROUP (AUSTRALIA)

SEE REVIEW IN THIS ISSUE

The highly acclaimed series of superb wargames.
Now fully available in the UK.

TITLES

REACH FOR THE STARS*(Galactic Empire building)
EUROPE (3 WW II Aerial Campaigns)
CARRIERS AT WAR (6 WW II, pacific Theatre, Carrier Ops.)
RUSSIA (The Great War in the East 1941-45)
DECISIVE BATTLES OF THE AMERICAN CIVIL WAR VOL I & II (Battles)
BATTLE FRONT (4 WW II Battles)
BATTLES IN NORMANDY (8 D-Day Campaign Actions)
CAUSE OF MONTEZUMA (8 battles of the US Marine Corps.)
ROMMEL'S BATTLES IN NORTH AFRICA

All titles £29.99 each (disk only)

Available for C64/128, Apple II, *Mackintosh

Run 5 Magazine (SSG's own, analysis and new scenarios) **£3.00**

Mail order: UK add 91.00 per title, Europe add £2.00
Run 5 add 0.50p/£1.00

London Games Warehouse Ltd., **Tel: 07375 53600**
15 Court Hill, **01-553-4345**
Chipstead, **01-727-9275**
Surrey. CR3 3NQ.

Wholesale rates available for UK and European retailers.

ABACUS TITLES

SUPER C	£29.95p
COBOL 64	£29.95p
CADPAK 64	£22.95p
CHARTPAK 64	£22.95p
SUPER PASCAL 64	£22.95p
TAS 64	£22.95p
P.P.M. 64	£22.95p
VIDO BASIC 64	£19.95p
ASSEMBLER/MONITOR 64	£ 5.95p
TINY FORTH 64	£ 5.95p

UTILITIES/APPLICATIONS

PASCAL & ASSEMBLER	£19.95p
EASY SCRIPT	£14.95p
EASY SPELL	£ 9.95p
BASIC COMPILER 64	£ 9.95p
FUTURE FINANCE	£ 9.95p
PILOT	£ 9.95p
LOGO	£ 9.95p
SIMON BASIC EXTENSION	£ 4.95p
ULTRABASIC 64	£ 4.95p

EDUCATIONAL

HIGHER MATHS (GCSE)	£11.95p
SHAPING UP WITH NUMBERS (4-7 YRS)	4.95p
INTRO TO BASIC BASIC 1 & 2	£ 4.95p

GAMES

ARCADE EXTRAVAGANZA	£ 2.99p
BEAM RIDER	£ 2.99p
DEADLINE	£ 2.99p
DANDY	£ 2.99p

GAMES

GUNSHIP	£ 2.99p
HERO	£ 2.99p
HESGAMES	£ 2.99p
HIGH FLYER	£ 2.99p
LITTLE COMPUTER PEOPLE	£ 2.99p
MAIL ORDER MONSTER	£ 2.99p
MASTER OF THE LAMPS	£ 2.99p
MIND SHADOW	£ 2.99p
PITFALL	£ 1.99p
PITFALL II	£ 2.99p
RAIL BOSS	£ 2.99p
ROCK 'N' BOLT	£ 2.99p
SPACE SHUTTLE	£ 2.99p
STAR CROSS	£ 2.99p
SUSPENDED	£ 2.99p
TOUCHDOWN FOOTBALL	£ 2.99p
TOY BIZARRE	£ 2.99p
ZENJI	£ 2.99p
ZORK	£ 2.99p
ZORK II	£ 2.99p
ZORK III	£ 2.99p

NOTE:- GAMES ARE **SUBJECT TO AVAILABILITY, PLEASE STATE 2ND CHOICE WHEN PLACING AN ORDER**

C-64 BOOKS

ANATOMY OF THE 64	£ 2.95p
TRICKS & TIPS	£ 2.95p
MACHINE LANGUAGE	£ 2.95p
ADVANCED MACHINE LANGUAGE	£ 3.95p
FANTASY FIVE	£ 2.99p
GALACTIC CONTROLLER	£ 2.99p
PEEKS & POKES	£ 3.95p
C-64 GRAPHIC BOOK	£ 6.95p
1541 DISK DRIVE - ANATOMY	£ 6.95p
GEOS - INSIDE & OUT	£11.95p

C-128 SOFTWARE (all disk)

ABACUS TITLES

Super C 128	£34.95p
P.P.M. 128	£34.95p
SUPER PASCAL 128	£34.95p
TAS 128	£34.95p
COBOL 128	£29.95p
CADPACK 128	£29.95p
CHARTPAK 128	£29.95p

ABACUS C-128 BOOKS

BASIC 7.0 INTERNALS	£16.95p
C-128 INTERNALS	£12.95p
TRICKS AND TIPS	£12.95p
CP/M USER'S GUIDE	£12.95p
1571 INTERNALS	£12.95p
BASIC TRAINING GUIDE	£11.95p
PEEKS & POKES	£11.95p

AMIGA 500 OFFER

AMIGA 500; - With Mouse, TV Modulator, Deluxe Paint 1, Defender of the Crown Game, Star Glider Game, Goldrunner Game, Amiga BASIC Disk, Amiga CLI Workbench V1.2. Disk, Amiga First Time User's Tutorial Disk, Introduction to the Amiga 500 Manual, Amiga BASIC Manual.

Superb Value
Only £445
Inc. VAT and Delivery

NOTE: ALL HARDWARE IS GUARANTEED FOR 1 YEAR FROM DATE OF PURCHASE

AMIGA 500; -
AMIGA 500; - With all the listed above, except TV Modulator, plus the NEW Commodore 1084 Hires 14 Inch Colour Monitor.
+
1084 MONITOR
Only £725 inc. VAT & Delivery

All Prices Include P&P in U.K., Otherwise Add 20% Per Item Air Mail).
ACCESS/Mastercard Orders and Enquiries Welcome - Tele 0706 43519
Send Cheque/P.O./ACCESS or Mastercard No. to:- RAMSOFT (Dept DUA), 24 Bankfield Lane, Norden, Rochdale, Lancashire, OL11 5RJ.

CONTENTS

Commodore Disk User
Volume 1 Number 4
May/June 1988

IN THE MAGAZINE

Update 6
The latest Commodore disk news

Four speed cartridges 8
The top four C64 utility add-ons compared

Reviews 12
The latest games on disk

Disk instructions 30
How to use this month's disk

ROMantic stories 31
The bug-free Commodore can be achieved

Disk Dungeons 32
News and views for the disk adventurer

Inside Basic 35
How the interpreter works

The height of resolution 38
Venturing into hi-res graphics

Strategic studies 40
Australian strategy games invade the UK

Competition 43
Disks up for grabs

ON THE DISK

Drumsynth 16
Percussive programming

C128 pull-down windows 19
Windowing for the 128

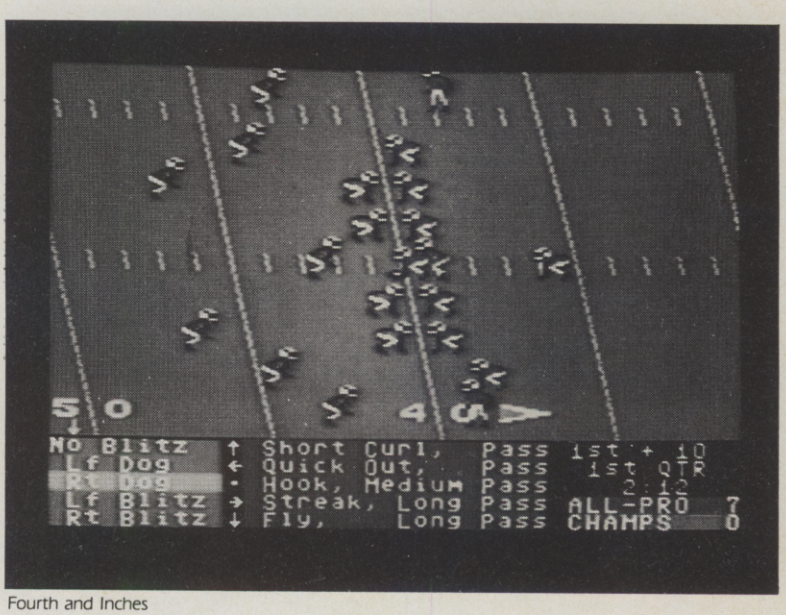
Tokeniser 20
Wordprocess your Basic programs

C-CAD 24
Enter the world of Computer-Aided Design

Basic compactor 28
Squeeze your Basic programs

Santolus 29
A demanding smooth-scrolling maze

Atlantis 29
Explore the lost Continent



Fourth and Inches

Editor: STUART COOKE
Deputy Editor: FIN FAHEY
Artist: ALAN BATCHELOR
Advertisement Manager: SARAH MUSGRAVE
Copy Control: LAURA CHAMPION
Origination: EBONY TYPESETTING
Design: ASP DESIGN STUDIO

Distribution: S.M. DISTRIBUTION
Printed by: CHASE WEB, PLYMOUTH

ARGUS PRESS GROUP

Commodore Disk User is a bi-monthly magazine published on the 3rd Friday of every alternate month. Argus Specialist Publications Limited, Commodore Disk user, 1 Golden Square, London, W1R 3AB. Telephone: 01-437 0626 Telex: 8811896

Opinions expressed in reviews are the opinions of the reviewers and not necessarily those of the magazine. While every effort is made to thoroughly check programs published we cannot be held responsible for any errors that do occur.

The contents of this publication including all articles, designs, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications Limited. All rights conferred by the law of copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications Limited and any reproduction requires the prior written consent of the Company.

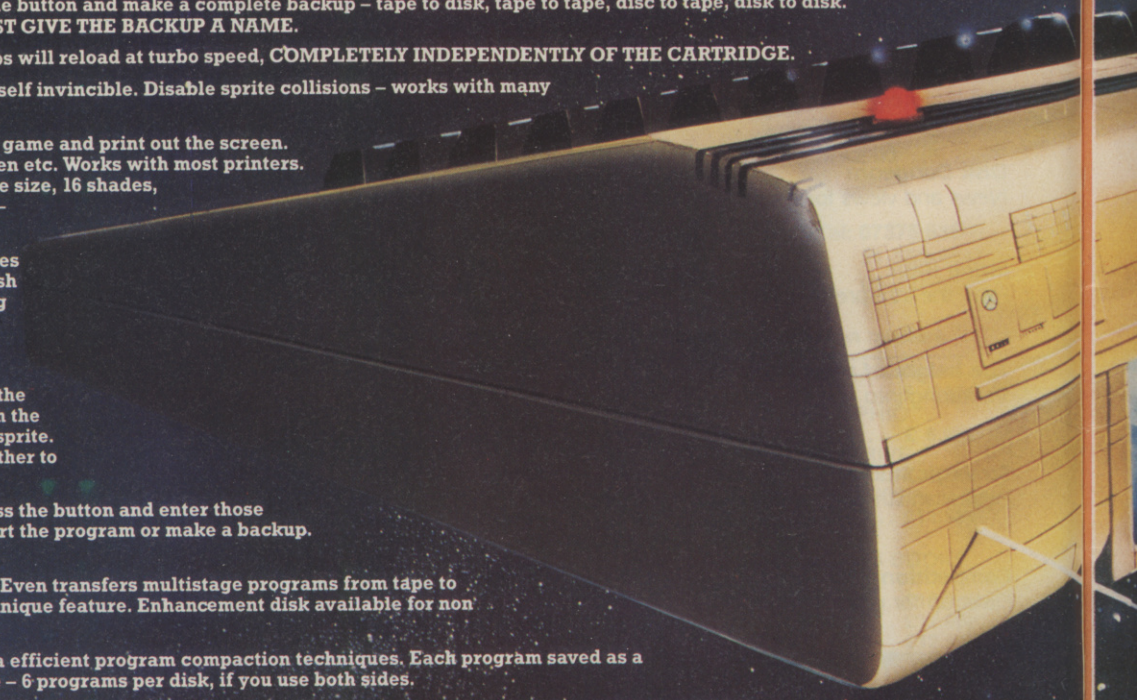
©1988

TOTAL BACKUP POWER
Now ACTION REPLAY

NOW EVEN MORE POWERFUL, MORE FRIENDLY AND WILL

ONLY £29·99 POST FREE

Action Replay works by taking a *'SNAPSHOT'* of the program in memory so it doesn't matter how the program was loaded – from tape or disk – at normal or turbo speed.



- **WARP 25. THE WORLD'S FASTEST SERIAL DISK TURBO – NOW EVEN FASTER! LOADS 200 BLOCKS IN 6 SECONDS! 240 BLOCKS IN 7 SECONDS!** – that's even faster than some parallel systems. Built into the cartridge – no extra hardware or software required. Includes supercast, warpsave, scratch, filecopy/convert. Integrated with normal disk turbo for supercompatibility – auto detects warp or normal format so no special load commands are required. Turbo and Warp 25 speed are entirely independent of the cartridge with SUPERBOOT.
- **SIMPLE TO USE:** Just press the button and make a complete backup – tape to disk, tape to tape, disc to tape, disk to disk. THE PROCESS IS AUTOMATIC – JUST GIVE THE BACKUP A NAME.
- **TURBO RELOAD.** All backups will reload at turbo speed, COMPLETELY INDEPENDENTLY OF THE CARTRIDGE.
- **SPRITE KILLER.** Make yourself invincible. Disable sprite collisions – works with many programs.
- **PRINTER DUMP.** Freeze any game and print out the screen. Eg. loading picture, high score screen etc. Works with most printers. MPS 801, 803, Star, Epson etc. Double size, 16 shades, reverse print option. Very versatile – no user knowledge required.
- **PICTURE SAVE.** Save any Hires multicolour screen to disk at the push of a button. Compatible with Blazing Paddles, Koala, Artist 64, Image System etc.
- **SPRITE MONITOR.** Unique Sprite monitors allows you to freeze the action and view all the sprites, watch the sprite animation, save or delete any sprite. Load sprites from one game into another to make customised programs.
- **POKES/CHEAT MODE.** Press the button and enter those pokes for extra lives etc., then restart the program or make a backup. Ideal for custom games.
- **MULTISTAGE TRANSFER.** Even transfers multistage programs from tape to disk. The extra parts fast load – a unique feature. Enhancement disk available for non standard multi-loaders (see below).
- **SUPER COMPACTOR.** Ultra efficient program compaction techniques. Each program saved as a single file. 3 programs per disk side – 6 programs per disk, if you use both sides.
- **TEXT MODIFY.** Change title screens, high score screens etc. Put your own name into a game then restart it or make a backup to tape or disk. Very simple to use.
- **MONITOR.** Full feature 'Floating' type MACHINE CODE MONITOR. All standard features plus many more:- assemble, disassemble, hex dump, interpret, transfer, compare, fill, hunt, number conversion, bank switching, relocate, load/save etc. Uses no memory. Full printer support.
- **DISK MONITOR.** A special monitor for use on the RAM inside your disk drive. All the usual commands – a useful hacking tool.
- **WHOLE DISK COPY.** Copy a full unprotected disk in under two minutes with only one drive.
- **FAST FILE COPY.** Works with standard and Warp 25 files of up to 249 blocks. Converts formats to and from Warp 25.
- **FAST FORMAT.** Under 20 seconds.
- **TOOLKIT COMMANDS.** A whole range of useful new commands including: AUTO LINE NUMBERING, DELETE, MERGE, APPEND, OLD, LINESAVE, etc., PRINTERLISTER – list any program (including directory) directly from disk to printer or screen without corrupting memory.
- **REDEFINED FUNCTION KEYS.** Single stroke commands for operation of many common commands including: LOAD, SAVE, DIR. Load from directory – no need to type in filename.
- **TAPE TURBO.** Designed to make turbo load/save for your own programs. No screen blanking during loading.

REMEMBER all features are built in and available at the touch of a key. All features work with both **TAPE** and **DISK.** (Except multipart transfer & disk file utility).

ENHANCEMENT DISK

Contains routines for transferring many of the non-standard multi-load games from tape to disk. Over 40 titles. Latest additions are **LAST NINJA, ROAD RUNNER** (infinitive lives option), **BLOOD 'N' GUTS** (play any event), **DECEPTOR, LEADERBOARD EXEC** and **WORLD CLASS, KILLED UNTIL DEAD, MASK, INDIANA JONES, IMPLOSION, TAIPAN,** plus all the classics including **SUMMER GAMES, WORLD GAMES, DRAGONS LAIR** 1 and 2, **GAUNTLET, SUPERCYCLE** etc. Works in conjunction with **ACTION REPLAY.**

Disk includes **GRAPHIC SLIDESHOW** for displaying pictures saved with **ACTION REPLAY.** Plus Warp 25, Superboot – non Action Replay owners can speed up their 'expert' or 'freeze machine' programs to see what they have been missing.

TAKES A QUANTUM LEAP
MK IV HAS ARRIVED!

FOR CBM64/128

BACKUP MORE PROGRAMS THAN ANY RIVAL UTILITY.

BUT THATS NOT ALL ... NOW AVAILABLE FOR THE SERIOUS PROGRAM HACKER

ACTION REPLAY IV 'PROFESSIONAL'™

● All the features of the normal Action Replay IV but with an amazing on board LSI LOGIC PROCESSING CHIP. Plus 32K operating system ROM and 8K RAM CHIP. The first RAM/ROM based cartridge of its type!

ALL THE MK IV FEATURES PLUS ...

● **FULLY INTEGRATED OPERATION.**
The MK IV 'Professional' has all the features of the MK IV plus an onboard custom LSI LOGIC PROCESSING CHIP that integrates the whole range of utilities and makes them available at the press of a button at any time.

● **EXTENDED MONITOR.** The 'Professional' has an extra powerful machine code monitor. Because it has both ROM and RAM at its disposal the Professional can freeze any program and then examine the WHOLE OF COMPUTER MEMORY in its frozen state including screen RAM, ZERO PAGE and STACK.

Full feature disassembly, compare, fill, transfer, hunt, relocate, jump etc. etc. In fact all the features of the best fully blown monitor available. Return to the frozen program at the press of a key at the point you left it! An absolute must for the program hacker – or even the programmer who needs to de-bug his program.

● **INTELLIGENT HARDWARE.**
The Professional hardware is unmatched anywhere in the world today. The special logic processing chip can cope with protection methods as they appear by reacting to its environment.

MK IV PROFESSIONAL ONLY £34.99 POST FREE

WARP 25
Reloads an average BACK-UP in 6 Seconds!!

UPGRADE INFORMATION

MK III TO MK IV. Just send £9.99 and we will send you the new MK IV Chip to plug into your cartridge. Fitting is very easy.
MK III TO MK IV 'PROFESSIONAL'. Send your old cartridge plus £19.99 and we will send you a new Professional MK IV.

MK 2 Action Replay owners can get £10 as part exchange against either the MK IV or Professional. Send old cartridge plus balance.

PERFORMANCE PROMISE

Action Replay will backup any program that any other cartridge can backup – and more! It also has an unmatched range of onboard features. Before you buy check our competitors ads to see what they offer and see how many of the Action Replay MK IV features are either not there or have to be loaded from Supergate disks etc. When you buy Action Replay if you don't find our claims to be true then return it within 14 days for a full refund.

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

HOW TO ORDER ...

BY PHONE	BY POST	EUROPEAN ORDERS
0782 273815 24 hr Credit Card Line	Send cheques/PO's made payable to 'Datel Electronics'	ADD £1.00 P+P OTHER COUNTRIES ADD £3.00 P+P Fax Orders 0782 264510

DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT.

SALES ONLY	TECHNICAL ONLY
0782 273815	0782 202258

Update

The latest news and products for Commodore disk users

New deal from EA

Superpower poker from EA – can you face down the big boys?

Among Electronic Arts' latest batch of releases is Card Sharks, Accolade's card-playing simulation which covers games as diverse as Poker, Blackjack and Hearts.

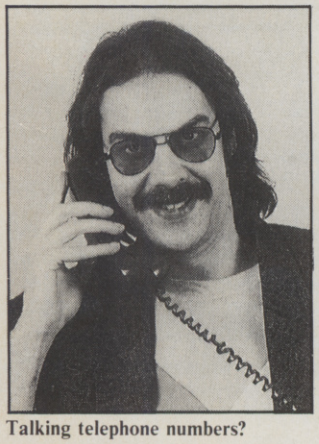
The opponents in Card Sharks are controlled by the computer and the player can interact with them in a realistic fashion. EA says that each has its own style and strategy of play. The computer players ask questions and speak their mind when the game turns 'sour'. This could be a frightening experience since possible opponents apparently include Gorbachev, Reagan and Thatcher.

Besides Blackjack and Hearts, the player has a choice of three variants of poker: Five Card Draw; Seven Card Stud; and Texas Hold 'Em. The game ends when the player breaks the bank or loses all their money.

EA has also put two of its existing products together with the release of The Archon Collection. This is a combination of Archon and Archon II: Adept.

The original boardgame Archon was developed in 1983, and involves a fantasy role-playing scenario. Both Card Sharks and the Archon Collection cost £9.95.

For more information contact Electronic Arts on (0753) 49442.



Talking telephone numbers?

Brain drained

Britain is to lose the talents of Rob Hubbard, the man who has single-handedly defined the style of home computer music. He's off to work for Electronic Arts at the company's US headquarters in San Mateo, California.

Hubbard is responsible for the music on over 60 programs. He is no newcomer to EA, having spent three months working with the company last summer. His catchy synth style has been, and will remain, widely imitated.

Excelerator down

Evesham Micros continues its assault on the C64-compatible disk drive market. The company's slimline Excelerator+ drive has been cut in price by £30 to £129.95, and now comes bundled with the window-based operating system GEOS (Graphic Environment Operating System).

The Excellerator can also be purchased with the Freeze Machine cartridge and GEOS for £149.95. Evesham attributes the latest cuts to the weak dollar. If you want to know more, get in touch with Evesham Micros on (0386) 765500.

Logotron launches low-cost line

Logotron Ltd is launching a range of inexpensive business software with a triplet of packages for the C128. The range comprises a wordprocessor, spreadsheet and database at £12.95 each.

Collectively these are known as the 1295 series. All three programs can be purchased for £29.95. The software will be distributed through dealers and high street stores.

The company says that the packages come with user-friendly features such as 'at a glance' summaries of features available, and that a user can work their way around the program without having to refer to a manual. Each program uses the same command structure, ensuring a short learning curve. The programs are integrated - information can be exchanged between them.

For more information on the 1295 range contact Logotron on (0223) 323656.

Delta skelta

The new Delta joystick from RAM Electronics features contains no less than six microswitches. The stick, which comes with a two-year guarantee, retails at £9.99 and is equipped with two Fire buttons, plus an Autofire facility. The manufacturer says that it is designed for either tabletop or hand-held games playing.

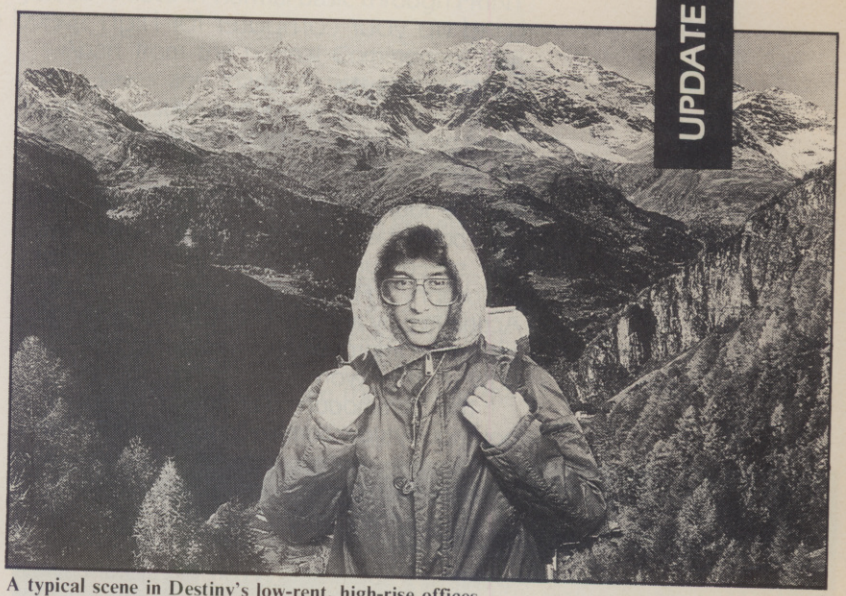
For more information on the Delta, contact RAM Electronics on (0252) 850085.

Date with Destiny

Destiny Software is getting together with climber Chris Bonington in a search for the elusive Yeti. The company is publicising its first game release, Yeti, by arranging a £30,000 competition based on a forthcoming Abominable-hunting expedition to the Himalayas by Bonington.

It seems that William Hill, the bookmakers, is offering odds of 150:1 against Bonington's expedition finding conclusive proof of the existence of the creature. Destiny has a £200 bet on the result and will give the money away if the bet is won. The winner will be the person who comes up with the best 50-word description of what they think the Yeti looks like.

The game itself will be released in March, and will cost £9.95. For further details contact Destiny Software on 01-567 6677.



A typical scene in Destiny's low-rent, high-rise offices

A Stoogey diet?

Can Mirrorsoft profit from the nostalgia boom? The latest release in the company's Cinemaware range is an 'interactive computer movie' starring that loveably inept comic trio from the 50s and 60s, the Three Stooges.

In the game, the hapless three have to save a little old lady and her three daughters, who run a broken-down orphanage, from financial ruin. Makes a change from killing things.

The vital thing is to raise the cash, which the Stooges have to do by winning money on a prizefight, waiting on table for a society dinner (this one guaranteeing the customary pie throwing) and pretending to be doctors. A filmic Trivia Quiz comes as part of the package.

More traditional computer game fare is provided by the same company's Rocket Ranger. This leans more on the pulp tradition, from Flash Gordon to Indiana Jones. In this shoot-em-up, you can blast away Axis warplanes from the comfort of your Rocket Suit, rescue beautiful ladies and kidnapped scientists, take on Nazi hordes with your trusty Ray Gun (Mirrorsoft's breathless capitals, by the way) and finally search for the wonder-element Lunarium, which you need to achieve a final victory over the afore-mentioned on the Moon. Gasp!

Rocket Ranger should be worth a look. It's produced by the same team who knocked out the intelligent game Defender of the Crown.

The Three Stooges and Rocket Ranger will retail at £14.99. If you want to know more, Mirrorsoft is on 01-377 4837.

Designer modem

Dataphone Ltd has released a new modem based on the company's existing Demon II, but retailing for less than £100. Dataphone says that a number of additional features have been designed in.

Called the Designer, the new device has full BABT approval, full computer control, auto dial from keyboard or directory and an auto-answer facility for unattended operation. It will handle 1200/75 and 300/300 baud rates, plus 1200/1200 half duplex for bulk uploading, and, like the Demon II can automatically select the correct baud rate.

New features include over-ride buttons for use with manual software, a call progress monitor wich allows users to hear what is happening on the line, and a phone socket on the rear which permits a telephone to be connected in parallel.

Software to allow computer users with the Designer or the Demon II to log on to Prestel or Telecom Gold is available for most computers for less than £50.

For more details on the Designer contact Dataphone on (0733) 230240.

Four Speed Cartridges

Load up your computer for high speed disk action.

by Eric Doyle

The four titans of the cartridge world all boast fast loading backup systems with speeds undreamed of in Commodore's philosophy. Freeze Machine, the Expert, Action Replay and the Final Cartridge all boast incredible improvements in loading times but how do they work?

The Commodore disk operating system is notoriously slow compared to just about every other disk system on the market. The advantage, in Commodore's eyes, originally lay in compatibility with their older PET systems but mainly this slowness is attributed to creating a super-safe recording system. Most fast disk systems use this as their first area for compromise.

As a program is saved, the 1500 series of drives check that each sector has correctly copied the data which has been written to it. Strip away this verification and you've already improved loading and saving times by a factor of seven. Fortunately, the drives are so reliable that cases of errors arising are few and far between but always remember that your drive is performing without this safety net.

To reach the incredible speeds quoted in the adverts a few more tricks are employed. Apart from data compression, short routines can also be wedged into the disk drive's buffer RAM to speed up track access and data transfer to the computer. In some cases special track and sector chaining controls are also employed which ensure that the read/write head of the disk doesn't have to jump around too much from track to track in the search for each program sector.

Apart from faster loading speeds, the cartridges often have more facilities to offer so, before discussing the speed test results, here is a roundup of these extras.

The Freeze Machine

Evesham Micros has blended two utilities into this cartridge: the Lazer Mk II fast disk system and Freeze Frame Mk V.

The casing is bright red with two buttons marked 'Freeze' and 'Reset'. When the computer is turned on the screen displays the fastload (Freeze Frame) menu but the reset button can be used to toggle between this mode and the Lazer system.

The two systems are identical in every respect but one - speed. The Lazer system employs its own form of disk storage which can be used in the absence of the cartridge if necessary. The file is an unerasable, USR file and needs a special loader to handle the stored data. The loader can be stored anywhere in the disk directory but the obvious place would be at the beginning of the disk so that it can be loaded with the minimum of fuss. Unlike some systems, there is no built-in method of reorganising an existing directory to shuffle the boot loader to the top of the directory, so its up to the user to remember to store the boot immediately after formatting each new disk.

Apart from the expected functions such as directory display, formatting and other direct disk commands, the system lacks the trimmings that all of the other systems contain but the basic cartridge can be enhanced using a disk from Evesham for £7.95. This has several utilities which help with specific problems which may be encountered with various software systems.

The cartridge does give a DOS system which can be used from Basic to control the disk drive. This acts in a similar manner to the DOS wedge on the 1541 Test/Demo disk as supplied with each drive but all of the functions operate at fastload speeds.

The Expert

Trilogic's Expert cartridge is the only one which contains a RAM chip in place of the normal ROM storage. This has the disadvantage that the cartridge has to have its operating system loaded in from disk each time it is used. The great advantage of this arrangement is that the cartridge can be regularly updated as modifications to the system are devised. Over the past few years the growing range of extra utilities has meant that the cartridge has grown from a simple backup unit. With sprite grabbers, screen grabbers and various other aids, the flexibility of the system is only really limited by the ingenuity of Trilogic's development team and the constraints of the size of the memory chip.

The cartridge has a three positive switch - PRG, ON and OFF. In PRG mode the RAM memory can be loaded with the required utility which is retained in the cartridge by switching to the ON position. In the OFF position, the cartridge is not operational but the power supplied by the computer is maintained to hold the program until it is needed again.

The program takes the form of a full monitor program with a wide range of commands including one which compacts the

program and saves it to tape with a special decompactor routine which restores its original form when loaded again.

When saving a long program which may use the same area that the Expert needs as a 'foothold' in the computer, there is a command which allows the user to specify a more convenient part of memory for the Expert to use. The location for this block can be searched for using the other monitor commands but the instruction manual gives guidance on suitable positions for those with a limited knowledge of machine code programming.

The cartridge could be improved by the inclusion of a small battery which would hold the program in place for a year or so, or at least until a new master disk becomes available.

A special fastload/menu program is contained on the current master disk. This has been designed to use disk sectors at the end of the area reserved for the directory information. This means that the available sectors for program storage are not affected so, although the program occupies about eight directory sectors, the entry indicates a zero block count. The use of available directory sectors does mean that fewer programs can be stored but this rarely causes problems since most disks only have enough blocks to store three or four Expert saved programs.

For those difficult, well-protected programs, the cartridge has a special ESM unit which detects the problem and can render the program in a suitable form for saving to disk.

Action Replay Professional (MkIV)

This system from Datel is one of the most flexible of the ROM cartridges and offers a very similar range of extra facilities such as found on the Expert system disk. Sprites can be viewed and modified or saved, specific screens can be grabbed from programs and stored as a totally independent piece of art. There is even a facility to save the screens to tape only, for display as a slideshow-style art gallery!

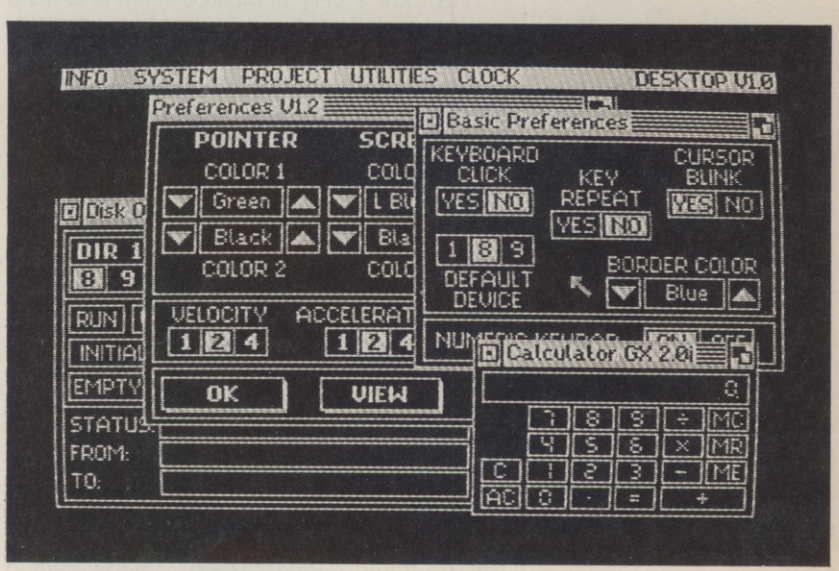
The cartridge also contains a fastload system which can be used from Basic. The system also contains a DOS system similar to that contained in Freeze Machine.

The Cartridge's monitor has all of the normal monitor functions but also includes a few imaginative and useful extras. Three of these provide special commands for disk - memory execute, block read and block write. Block read and write allow sectors to be read from disk, modified and then written back to disk again. Memory execute is a special command which executes a program stored in the RAM or ROM of the disk drive itself.

Another very useful command allows Basic commands to be executed within the monitor environment. For example, to add two numbers the command BPRINT X+Y will add the value X to the value Y and print the result, just as it does in normal Basic through PRINT X+Y.

Apart from the normal Commodore disk speed saves and loads, Action Replay has a turbodisk system and a truly amazing Warp 25 high speed system which allows loading times to challenge the amazing performances of dedicated chip-based systems such as Dolphin DOS, Lightning and Datel's own Professional DOS - but more of this later.

Action Replay also contains extra Basic toolkit commands which can ease program writing. OLD, selective line deletes, MERGE, APPEND, selective linesave are just some of the commands. For a full list see the table at the end of this article.



The-final: A Rom with a view

The Final Cartridge III

This is a very impressive-looking but cumbersome system which is also supplied by Datel but originates from H&P Computers in Holland.

There are two distinct modes within the cartridge - a desktop or GEOS style system and a program freezer backup.

The desktop utilises a full WIMP system with pull-down menus and display windows which allow all sorts of controls over screen display parameters and disk operations. Most of the functions offered can be more easily implemented through conventional keyboard commands on any of the other systems and, like GEOS, it seems much too gimmicky for my tastes - more a Yuppie-tility system than anything else.

Despite the similar pull-down menu approach of the Freezer section, it offers nothing more than the other cartridges but manages to make access slightly less convenient. Most cartridge systems give a full screen menu with single keypress access to the facilities. With Final, the screen displays a menu

► ► ► ► ► ► ►

bar at the top from which a category is selected, revealing a further menu from which the actual function is selected - all very flash but incredibly tedious.

To recommend Final, there is an excellent extension to the standard Basic commands giving much more than a standard DOS system. Twenty-nine toolkit commands is pretty good going and certainly forms the strongest toolkit.

This thorough approach is also reflected in the monitor with block read and write commands added to a wide range of more conventional commands plus a very interesting facility which directs the monitor to the disk so that memory assembly and disassembly of the disk RAM and ROM can be achieved with no difficulty at all.

H&P are a very dedicated team and it's a pity that their talents have been directed towards including such a dreadful desktop system when even more, and better, alternative systems could have been included.

Speed trials

The main purpose of this article is to compare the speeds of the disk systems. To do this, a standard had to be set for which the following rules were applied:
A standardised 202 block program was devised.
Each disk held only one program unless a special boot program was required.
Loading times excluded the time taken to load, run and select from any incorporated menu/boot.
As far as possible, the time taken to decrunch the programs were excluded from the loading times.

The results varied widely and several myths were exploded as each test was run. Only one cartridge came through as my outright front-runner but bear in mind that this is based purely on the speed tests and not on the other facilities provided. These trimmings may change your mind and direct you to a different conclusion depending on the facilities which you consider essential to your needs.

As a Basis to work from, tests were first performed on the standard Commodore system and then on Dolphin DOS, one of the fast permanent disk systems currently available. The results rendered using the 202 block program (stored from $0801 to $CFFF) through a standard computer monitor gave a loading speed of 1.8 blocks per second (bps) and a save speed of 1.3bps for the basic Commodore system. With Dolphin DOS these rates became 33.6bps load and 20.2bps save.

Using the Expert system's menu boot program the same 202 blocks loaded in just 12 seconds, a speed of 16.8bps. When saving the program with the Expert, the program took 55 seconds to be crunched down to 158 blocks and this saved at normal Commodore speed which meant waiting just over three minutes for the whole process to be completed.

When the program was reloaded it took a mere ten seconds to load all 158 blocks (15.8bps) but a further seven seconds were required to decrunch the program (effective overall loading time of 9.3bps).

Both of the Freeze Machine routines rendered 202 block loading speeds of 9.6bps with the Fastloader and an improved 15.5bps using Lazer.

Compression of the program was the same for both of the systems, taking only 13 seconds and the save routines both took place at a speed of 10.6bps but the Fastload program was only 164 blocks long, nine blocks shorter than the special Lazer file.

Loading the programs back in showed the differences between the systems once more: Fastload 10.9bps and Lazer 17.5bps. In both cases, decompression took about four seconds so the effective speeds were 11.7bps and 12.5bps respectively.

The instructions claim that better loading times can be achieved by loading the programs through the cartridge rather than through the special boot program saved onto the disk. In tests this claim did not hold out, after several different trials the results always matched. Perhaps the results indicate a difference of less than half a second but certainly not sufficient to make me leap up and down with excitement.

By far the best performance was given by Action Replay's Warp 25 system. The normal turbo loader pulled in the uncrunched program at 10.6bps. To use the Warp system, the program had to be converted to the special Warp format which meant that the program extended across 214 blocks but the amazing speed reached was 35.6bps, a loading time of a mere six seconds.

The saving time of around 8bps was much the same for both systems after a crunch time of seven seconds but once again the Warp load time was a stunning 34.4 with a decrunching time of approximately three seconds. The turbo loader managed a respectable 10.9bps and including the decrunch factor the effective speeds became 21.5bps at Warp speed and 9bps at turbo speed.

The reason that Warp seems to challenge and slightly outstrip the Dolphin DOS is because the program is stored on consecutive sectors and tracks. The only problem with this method is that the disk cannot easily be filled with Warped programs unless sufficient consecutive tracks can be found, mixing Warps and normal programs is not recommended.

Wooden Spoon

Alas the poor Final Cartridge! Using the freezer after killing the desktop system resulted in a 8.8bps effective loading speed but not before a bit of name changing. When the

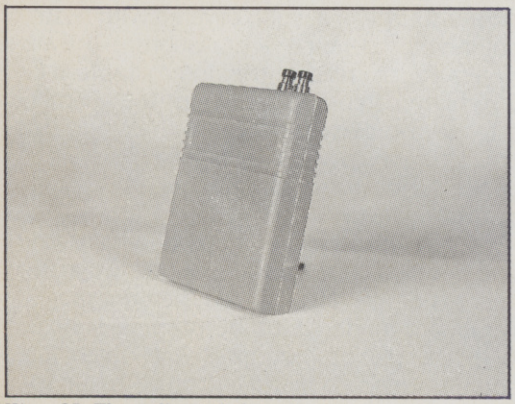
freezer saves a file (always at normal s-l-o-w speed), it gives the loader the name FC and the program the name -FC. Unfortunately, this doesn't seem to work in the standard C64 environment and the names have to be changed before the program will load.

Not too bad a result though, compared to what happened with the desktop switched in. It appears that the cartridge can only cope with programs which stop before $C400 so the tests had to be performed on a specially reduced test program of 190 blocks. Fast load took place at 14.6bps and the program, crunched down to 147 blocks, loaded with an effective speed of 8.6bps.

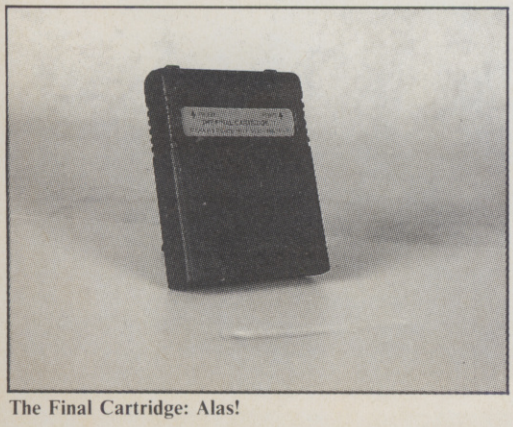
Special mention must be made of the Expert and Final Cartridge cruncher which reduced the 202-block program to 158 and 159 blocks respectively. Rather an impressive achievement but the Expert took almost a minute to do, just marginally more than the Final Cartridge achieved in only eight seconds.

Conclusion

On speed alone the undisputed champion cartridge is Action Replay's Warp 25. Never would I have believed that my Dolphin could be outpaced by a mere cartridge system. 214 blocks in six seconds means that bytes go in at the rate of just under 9Kb per second, or around 70,000 bits per second! I'm stunned, amazed and totally impressed. With everything else taken into consideration this is easily the best value for money cartridge amongst the four; the cartridge king!



Warp 25: The undisputed champion



The Final Cartridge: Alas!

Cartridge Comparison

Cartridge	The Final Cartridge III	Freeze Machine	The Expert	Action Replay Professional Mk IV
Price	£39.99	Lazer Fast £28.95	£29.99	Warp 25 Turbo £34.99
Load Speed (bps)	14.6	15.5 9.6	16.8	35.6 10.6
Save Speed (bps)	1.3	10.6 10.6	1.3	8.0 8.0
Cruncher Efficiency	21	14 19	22	15 19
Loader Size (Blocks)	9	6	0 (8)	0(4)
Basic Toolkit Commands	29	7	N/A	12
Monitor Commands	23	0	35	26
Collision Detection Off	Y	Y	Y	Y
Sprite Grabber	N	N	Y	Y
Screen Grabber	N	N	Y	Y
Joy Port Swap	Y	N	N	N
Program Text Modifier	N	N	N	Y
Poke Facility	Y	Y	Y	Y
Multistage Copier	N	Y	Y	Y
Special Features	Complete desktop WIMP system	Extra utility disk	Extra utilities for RAM cart supplied on disk	Enhancement disk for specific program backups

The Final Cartridge III

Basic Commands

APPEND	DLOAD	KILL	ORDER
ARRAY	DOS	LIST	PACK
AUTO	DOS"$	MEM	PDIR
BAR	DSAVE	MON	PLIST
DAPPEND	DUMP	MREAD	RENUM
DEL	DVERIFY	MWRITE	TRACE
DESKTOP	FIND	OLD	UNPACK

Monitor Commands

Assemble	Interrogate	Transfer memory
Compare	Load	X-it from monitor
Disassemble	Memory display	# dec to hex
Edit Character	O bank switching	$ hex to dec
Edit Sprite	OD monitor disk	@ disk commands
Fill memory	Print memory	*R read disk block
Go	Register display	*W write disk block
Hunt memory	Save	

The Expert Professional IV

Monitor Commands

+ set colours	Assemble	Jump to subroutine
Save	? dec to hex	Basic list
	K relocate	Transfer memory
$ directory	Compare memory	Load
Unhex		
# start/end	Disassemble	Memory display
Verify		
& hunt mask	Exclusive OR	New RAM
Warm start		
* address limits	Fill memory	Output registers
X RAM/ROM		
@ disk command	Go	Protect new
Z crunch save		
' enter ASCII codes	Hunt memory	Q crunch address
" enter screen codes	Increment	Restart

Freeze Machine

Basic Commands

@	disk command
%	load
↑	load and run
$	directory
f5	load first prog
£	cartridge off
+	configure memory

Action Replay Professional IV

Monitor Commands

@ disk command
$ display directory

* toggle RAM/ROM

@* toggle disk/computer memory
@ME execute drive memory

@BR read disk block
@BW write disk block

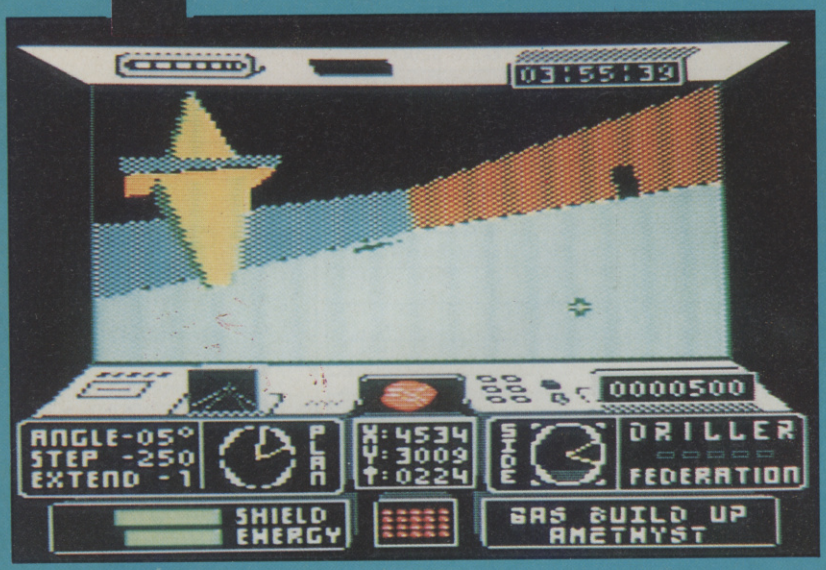
X-it monitor

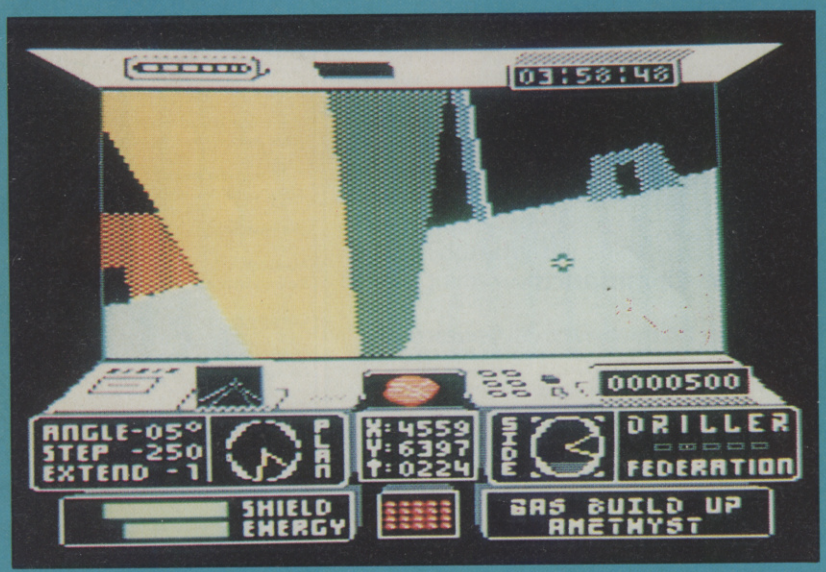
Assemble	Load
Basic command	Memory display
Compare memory	Number conversion
Dissassemble	Printer
Fill memory	Register display
Go	Save
Interrogate	Transfer memory
! *screencodes interpret as	Verify

Basic Commands

@	APPEND	OFF
/	AUTO	OLD
↑	BOOT	ON
&	DELETE	PLIST
£	LINESAVE	SLIST
£,W	MERGE	
@	MONITOR	

Reviews





AT A GLANCE

Title: Driller
Supplier: Incentive, 2 Minerva House, Calleva Park, Aldermaston, Berks, R47 4QW.
Tel: 07356 77288.
Price: £17.95
Graphics: Pretty but slow
Sound: Not much one way or the other
Playability: Possible if you mix playing with frequent sessions of Zen meditation.
Addictiveness: Some addictive content, but you have to wait around a lot for it.

Driller

With this game, Incentive has introduced Freescape. 'A revolutionary new system", trills the manual. "Hey, wow!", think I, flicking through the 32-page manual. "What is this, something like Novagen's Mercenary, only, like, more powerful?"

Thirty minutes on, we see one disappointed reviewer. Three-D, Freescape can do. Hidden lines? Fine, not a sign - this is a soft-solid system. Speed? Forget it. This has all the pacing of a Giant Galapagos tortoise on a treadmill.

I'm pleased to see that software houses can do this sort of thing on a regular basis, but I'm not prepared to go and make a cup of coffee every time I want to move around inside the game.

I did play on for a bit, though. As a graphic adventure, with some moderately involving puzzle content, this game does arouse a little interest.

The scenario involves installing gas vents on the surface of a moon covered with hostile autonomic defence installations. This is necessary to relieve the internal pressure which threatens to explode the hapless satellite (avoid reading the embarrassingly bad novelette which seeks to explain this state of affairs and turn quickly to the game instructions).

The moon is in the shape of a truncated and bevelled cube - if you want to waste five minutes of your life, you can even assemble a cardboard model of it that Incentive supplies with the game. That gives it 14 faces (the corners are no-go areas) and on each one you must install a drilling rig, after having first found a way to turn off the defences that threaten to fry you.

You can move your vehicle at a variety of angles and directions in the Freescape universe, controllable through keyboard or joystick, and the screen shows you a cockpit view of the surrounding landscape. This is moderately pretty, once you get to see it.

I don't have anything against slow, meditative games - in fact, I prefer them. This one, however, has ambitions towards the real time, in which case what you want is speed, speed and more speed. Fatally flawed. **FF**

Lords of Conquest

The Superpower blocs look locked in a battle neither can win. Massive armies on either side are poised to destroy each other. You've done all you could, and succeeded, as only you stand to gain by picking up states from the weakened powers. It took all your powers of persuasion and deception to start the war that only you can win. If you think you can sink this low just to to gain a minor advantage over your allies and opponents then you're just the type of player to fill a vacancy in the Lords of Conquest, EA's latest strategy wargame.

Lords of Conquest can be played between you and your computer or up to three other equally despicable opponents where off screen plans, agreements and peace treaties are shattered through simple joystick movements.

Lords of Conquest is wargaming at its simplest with single areas representing whole states, countries or continents depending on which of the 20 game maps you choose that include North America, Europe, Africa or the world to play or you can get the computer to generate a new map or build your own using the enclosed game creator. The battles are fought using weapons (infantry), horses (cavalry) and boats to transport the others across water to attack foreign lands.

You can customise your game to suit your mood from a basic but easy game to a complex war that will last long enough to ally and attack each player several times! The object of the game is to take as many cities as decided in the opening game options and this can vary from just over half to all of them. Cities have extra value as they produce gold at the end of each turn which can be accumulated in your stockpile until you decide to spend it to buy weapons to attack or city defences to protect your ill-gotten gains. Some states also contain breeding grounds that produce horses that can either attack on their own or carry a weapon to form a formidable attack force.

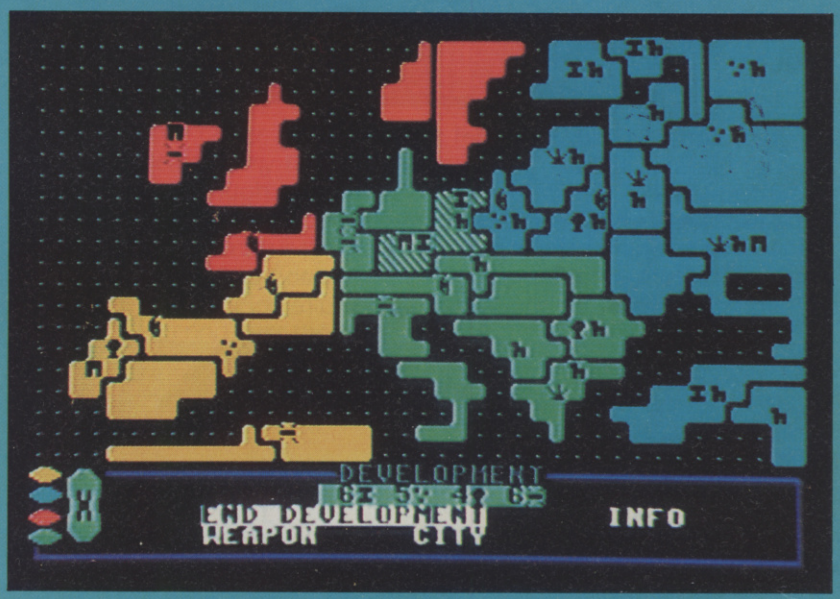
In more advanced games the map also contains coal mines, iron mines and wood mills to produce the materials that can also make weapons and cities as well as boats to transport weapons and horses across seas. The combinations of each resource to build your units of conquest can decide your tactics in the game.

You can also change the luck involved in combat. In the lowest level combat is a simple comparison of opposing forces with the attacker winning any ties. If you increase the level then ties are decided randomly and then in the highest level the chances of victory are decided by the proportion of attacker and defender so you can't guarantee a victory even if you outnumber your opponents.

In a one-player game you will have to face a computer opponent that never makes a mistake but also lacks the flair that could just win you the game. However, if you do win, the computer gives in and robs you of the chance to grind it into the dust!

Lords of Conquest is really suited to be played between you and other human players. Now you can talk, plan and scheme with and against the players leaving the mechanics and number crunching to the computer. These off-screen arrangements are played out in dramatic style especially during attacks. Whenever a player attacks an enemy any neighbouring player is highlighted on the screen and if the attacker calls for allies (and he must if he doesn't outnumber all powers in the region) these neutral players must select either attacker or defender. There's no sitting on the fence in this game!

The game is actually based on a board game called Borderlands which accounts for the easy to play but difficult to master game mechanics and the cut-throat interaction between players.



AT A GLANCE

Name: Lords of Conquest
Supplier: Electronic Arts, 11/49 Station Road, Langley, Berks, SL3 8YN.
Price: £14.95.
Graphics: A board and counters.
Sound: Fanfare for a victorious man!
Playability: Easy to learn.
Addictiveness: You'll be surprised how vicious you can get and how much you'll enjoy it.

4th and Inches

Any fan of sports simulations will no doubt be aware of the excellence of Hardball, a baseball game from Accolade. The good news is that the same company has now produced an American football game which is every bit as playable.

Not only do you get to call the plays, you also get the chance to execute them as well. Bringing in substitutes at appropriate moments and making the best use of your time outs complete the skills required.

As they say, tough, the play's the thing and that is where most of the action takes place. The computer gives you a choice of five offensive formations chosen from a list of eleven. The list is semi-random in so much as you will always get the chance to kick if that is a reasonable alternative. Other formations include the Shotgun, Double Wing and Weakside Back.

Once your basic formation is chosen, you must then choose the exact play be it running or passing. Again, you are offered five choices from a list of twenty four, not including the kicking plays.

While you are selecting your tactics, the defense (either a human or computer opponent) is selecting theirs and lining up according to whether they think you are going to run or pass the ball. A useful hint is that the computer very much favours a passing game.

Each player has a rating which is a trade off between speed and strength. Knowledge of a player's attributes is important when it comes to calling plays as there is little point in choosing your slowest, heaviest player to go charging down the field as they attempt to catch one of your long passes.

Once all the plays have been selected, the ball is snapped to the quarterback and you now control that player. Pressing fire hands off the ball or passes it and you gain control of the receiving player. You can now run and dodge as much as you want as you attempt to move upfield. Control of defensive players is similarly controlled.

The animation in 4th and Inches is excellent with, unusually, all twenty two players being shown on the screen. This is a bonus though. What makes this game stand out is its sheer playability. It is easy to get into, even if you have little understanding of the game and it has considerable lasting appeal. Fans of American Football need no longer suffer from withdrawal symptoms as they await the next Superbowl. **GRH**

AT A GLANCE

Title: 4th and Inches
Supplier: US Gold/Accolade
Tel: 021-356 3388
Price: £14.99.
Graphics: Well-animated characters
Sound: Nothing stunning
Playability: Even the fridge could understand this one
Addictiveness: One touchdown and you're hooked

Morpheus

I may be a lone voice in the wilderness but I see myself as the little boy in the Emperor's New Clothes fairy tale. This game is stark naked and Rainbird have been sold a dummy! I admit that the programming is awesome with its mega-sized ship filling most of the screen but it's dull, dull, dull to play.

Awfulness... sorry Morpheus is a good example of a programmer looking for a game designer. Some of the ideas are there but there's not enough to interest me for the exorbitant price of £17.95! Who the hell do they think they are, first they fob us off with Tracker, and now they put this one over on us. Where arcade games are concerned, Rainbird are like an inverse budget software house - budget quality at super high prices.

What am I ranting on about? Well, the Intelligence keeps creating Aithers, or universes, which are protected by Morphai. The commercial operation you belong to makes money by destroying Aithers and each new Aither is more difficult to destroy than the last one. Fortunately, you are earning money and can commission bigger and better equipment to help destroy the Morphai aliens and the Aithers themselves. So you go back and forth blasting out universes and building up your weaponry.

The only thing I like about this game is its name, after five minutes it leaves me nestled happily in the arms of Morpheus snoring my head off. Andrew Braybrook is a talented programmer who should seek out the likes of Dave Bishop and find out what gameplay is all about or stick to straight forward shoot'em ups. **ED**

At a glance

Name: Morpheus
Supplier: Rainbird Software
Tel: 01-240 8838
Price: £17.95
Graphics: Very impressive but to what end?
Sound: Bum chinga, bum chinga
Playability: Should be more fierce!
Addictiveness: A cure for insomnia has been found!

Project Stealth Fighter

It's time to cream the enemies of the American Way of Life again, as Microprose returns to the skies with this, the company's first fixed-wing flight simulator since the well-acclaimed F-15 Strike Eagle.

This is very much an update of the Strike Eagle formula, but now you're flying the F-19, sometimes known as the Ghostrider. This is the 'invisible' multi-role fighter which the Pentagon persistently claims does not exist, in spite of the highly authoritative evidence in the form of numerous plastic model kits.

The F-19 is an odd-looking aircraft, as it is designed to have the minimum of sharp angles, which reflect radar rather too well. Unfortunately its flight performance suffers as a result, and this simulation can't help but reflect that.

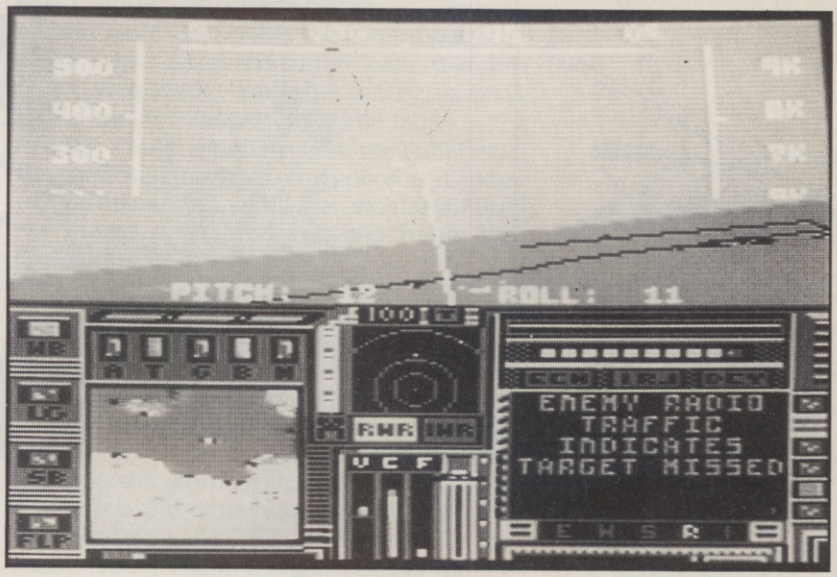
So, instead of stressing the 'frisbee's' manoeuvrability, climb rate, or whatever, this game rates you mostly on your ability to get in and out of hostile territory while being detected as little as possible, while also carrying out your mission.

The main flight screen closely resembles that on F-15 Strike Eagle, but with a few more options. As a result, Microprose has very kindly included a keyboard overlay - there's no other way you could keep track of all the controls. The main display shows enemy aircraft in wire-frame graphics, but unlike Strike Eagle, ground features have also now been rendered in the same format.

There's more added realism, since this time you have to land your plane properly - in the previous program, you simply had to overfly your home base. This F-19 carries a wider range of weapon options than the F-15, too. Besides infra-red and radar homing air-to-air missiles, the ordnance available for ground attack includes laser-guided bombs, anti-ship missiles, incendiaries and ordinary 'iron bombs'. Definitely one for the weapon fetishist, this game. Besides the weapons, you also carry infra-red and radar jammers, as well as decoys. You need them. There are four ferocious scenarios available, ranging from Libya up to the ultimate in dangerous skies, a Nato/Warsaw pact war in Central Europe. You can choose three levels of difficulty for each conflict, and can select how difficult your landings are going to be when, and if, you get home.

In the later scenarios, stealth becomes an absolute necessity. It's bad enough when you reveal yourself at the target - infra-red and radar-homing SAMs come at you from all directions, besides the ever-present threat of enemy fighters, and it's all you can do to avoid flying into the ground and keep the jammers going, let alone hit the target. It's understandable that you might want a quiet life on the way there and back.

Unfortunately, the concentration on invisibility (the program awards point scores largely based on your stealth performance)



makes this game rather duller than the F-15 simulator, at least to my taste, even though you can get through the dull bits on accelerated time. I used to enjoy the F-15 dogfights, but the incentive to indulge in these when flying the F-19 just doesn't seem to be there. Besides, your fuel margin doesn't usually allow much loitering over the combat zone.

Nevertheless, this is still an impressive piece of software, and landing your plane in one piece, while damaged and fast running out of fuel is a particularly challenging experience. Microprose's documentation is as extensive as ever, with a full set of combat maps and a 120-page manual in the box, besides the keyboard overlay (which incidentally fits either C64 or C128).

Project Stealth Fighter is compulsive enough for me to come back to it from time to time. Unfortunately, I don't think that I'll be doing that as often as I did with its more primitive, but more exciting predecessor. **FF**

AT A GLANCE

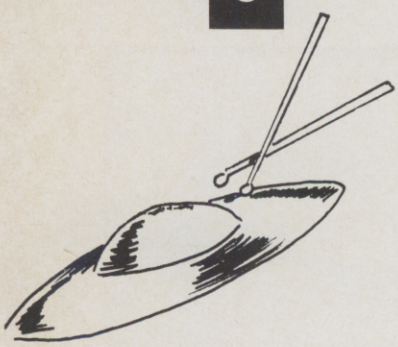
Title: Project Stealth Fighter
Supplier: Microprose, 2 Market Place, Tetbury, Glos GL 8 8DA. **Tel:** (0666) 54326.
Price:
Graphics: Speedy wire-frame routines.
Sound: Straining turbojets, punctuated from time to time by the depressing rumble of a SAM striking home.
Playability: Very - but you'll need that keyboard overlay, and a fast set of fingers.
Addictiveness: I'll fly all the missions - but I can't say when I'll finish.

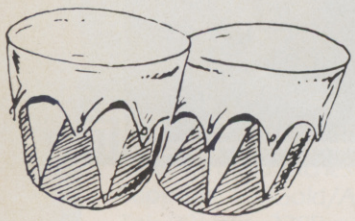
ON THE DISK

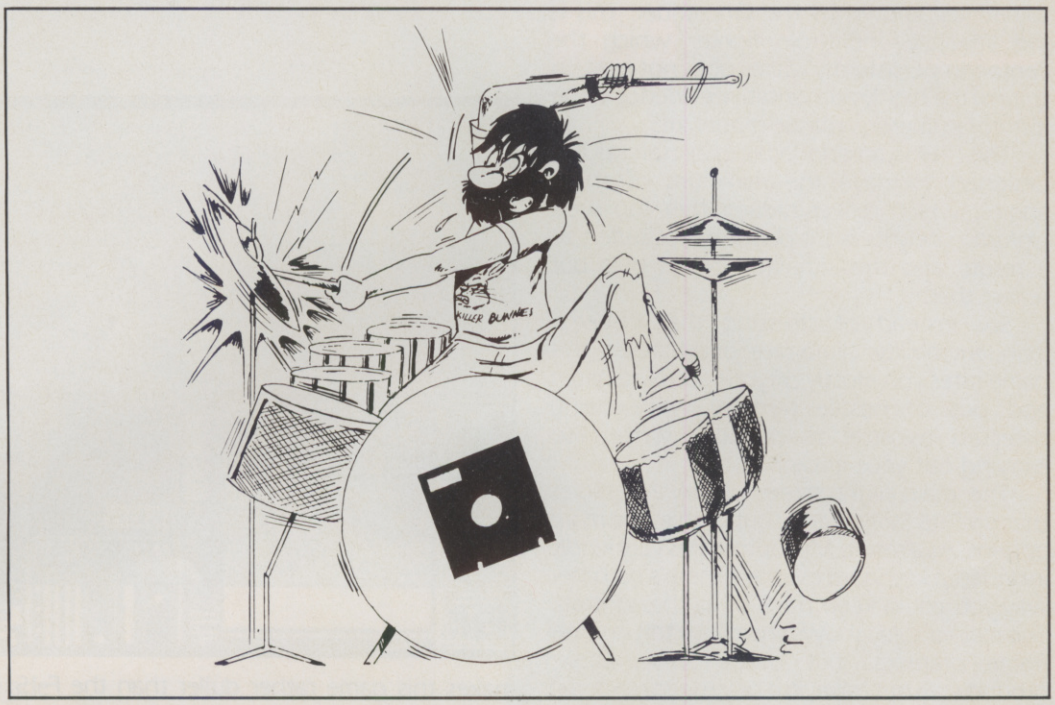
Drumsynth

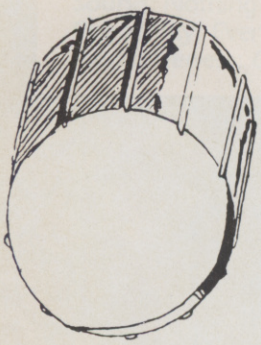
Uncover the percussive potential of your C64 with this easy-to-use drum synthesiser

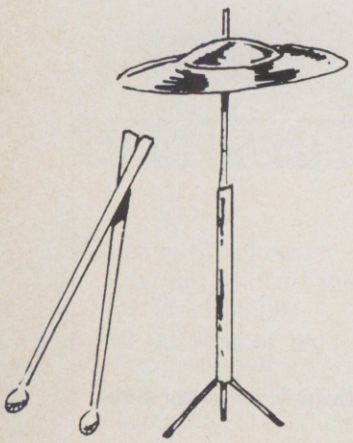
By Andrew D Leeder











This program, as its name implies, is a drum machine. It uses the Commodore 64's 3-voice sound chip (known as SID) to produce various drum sounds. Therefore, it is simple to create new sounds by changing the appropriate sound parameters. Drumsynth provides all of the functions required to enter, play, edit and store drum patterns. All of the basic functions of a drum machine are supported.

The sound quality of Drumsynth leaves something to be desired - it is by no means studio quality. However, it does allow for plenty of experimentation and flexibility. The sound quality could be greatly improved by using sampled drum sounds, as commercial units and software do. This is beyond the scope of this program, so I opted to use the SID chip to synthesise the sounds instead. The main disadvantage of this is that only three sounds can be played at any one moment, due to the three voices available on the SID chip.

The screen

The Drumsynth screen is divided into three main areas or windows. The first and most important is the Option window which contains eight icons representing the main options which are available. Any of these options can be chosen by moving the pointer (the small white arrow which is controlled by joystick) to the desired icon and pressing the joystick button. If an option is in use then it will be highlighted. Explanation of the options will be discussed later. There are also a number of keyboard controls which can be used when the pointer is within the Option window, they are:

CONTROL-V Changes the velocity (speed) of the pointer.
CONTROL-B Changes the screen border colour.
CONTROL-S Changes the screen colour.
CONTROL-C Changes the pointer colour.
CONTROL-P Instead of using the Pattern Change icon this can be used to jump to any of the 256 patterns. Simply enter a number between 0 and 255 and press RETURN.
CONTROL-X Exits the program, returning to the familiar blue screen and READY prompt.

The second window to the left of the Options is the Sound window. In this area are three symbols which each represent the selected drum sounds. Each symbol represents one of the three voices. Each voice can be changed to a different drum by moving the pointer to the desired symbol and pressing the button. There are eight sounds available, which are:

Cymbal (CYM)	Bass drum (BSD)
Low tom (LTM)	High tom (HTM)
Snare drum (SND)	High hat (HIH)
Bell (BEL)	Handclap (HCP)

Each drum name is abbreviated by three letters, these abbreviated names being present in both the Sound and Pattern windows. The third and last area of the screen is the Pattern

window. This is where all editing and recording of drum patterns takes place. Displayed in this area is a grid of eight lines (representing the eight available drum sounds), and each of these lines can be thought of as a separate track. This grid is 32 columns wide, each pattern comprised of 32 individual beats. Dots on this grid display where drum beats will and will not occur. Above the grid is a line which shows the current pattern number (0-255) and also the tempo for playback. Beats are turned on and off by positioning the pointer over the desired part of the grid and pressing the joystick button.

Patterns and recording

As mentioned above, each pattern is made up of 32 possible beats. Each of these beats can be on or off for each of the eight sounds. You may program all of the eight sounds with different combinations of beats but only three of these tracks (or lines) can be played simultaneously. These three tracks are specified by the sounds in the Sound window.

To record a pattern, ensure that you have selected the pattern number you want to record on (or edit). Now move the pointer down to the Pattern window and move it onto the circle or cross what you want to change. A circle represents where a beat will be played, a cross represents a rest. Pressing the joystick button toggles the beat on and off. You can continue in this fashion, and when finished move the pointer back to one of the other windows.

Options

There are eight icons in the Option window which represent the functions that are available. Here is an explanation of what each icon does:

PLAYBACK OF CURRENT PATTERN NUMBER (PIANO KEYBOARD ICON)

This option plays the current pattern displayed below in the Pattern window using the drum sounds in the Sound window. The pattern will play continuously until the joystick button is pressed again.

CHANGING THE TEMPO (METRONOME ICON)

When this icon is selected, the pointer will remain stationary and the joystick can be pushed left and right to decrease or increase the tempo, respectively. When the desired tempo is obtained, press the button again and control will be returned to the pointer. The tempo ranges from 0 through to 255, where 0 is the fastest and 255 is the slowest.

CUT, COPY AND PASTE (SCISSORS ICON)

This option can be used to rearrange and organise groups of patterns with the three basic editing functions it provides. When this icon is selected a bar will be displayed containing the words CUT, COPY and PASTE. The pointer is used to select the appropriate operation, and the button pressed to confirm it. Here is what each operation does:

CUT - Stores the current pattern in a special pattern buffer and erases the current pattern.

COPY - Also stores the current pattern in the buffer, but doesn't erase the pattern. It only puts a copy of the pattern in the buffer.

PASTE - Puts the pattern from the buffer into the current pattern slot. This operation can be used as many times as you like, and the buffer is not erased unless you exit and re-run the program.

SEQUENCING PATTERNS (UPPER RIGHT ICON)

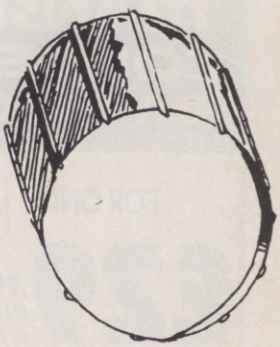
This option allows patterns to be sequenced (or chained) together. Any of the 256 patterns can be combined in any order, and each pattern can play up to 256 times. After selecting this icon, the following will appear on the top line of the screen:

ELEMENT 1 PATTERN? TIMES?

Firstly, you must enter the number of the pattern to be played (ranging from 0 to 255), press RETURN and then the number of times (1 to 256) for it to be played before proceeding to the next element of the sequence, and again press RETURN. You will be prompted for the second element and so on (the maximum number of elements in the sequence is 64). If you do not wish to enter all 64 elements then type 'X' on the 'PATTERN?' prompt to exit.

CHANGING THE PATTERN NUMBER (LEFT/RIGHT ARROWS ICON)

This option is similar to the tempo change option. When selected, the pointer will remain in the same position and the joystick can be pushed left or right to decrease or increase the pattern number. The pattern number will change in the window below and the grid will also change to the corresponding pattern. Again, pressing the button will return control to the pointer.

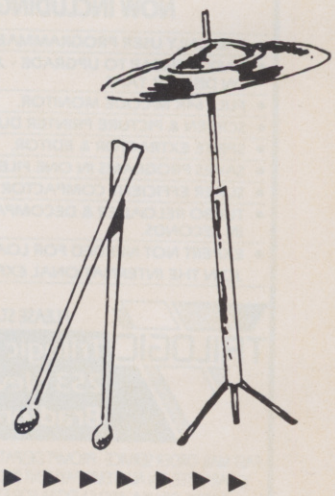


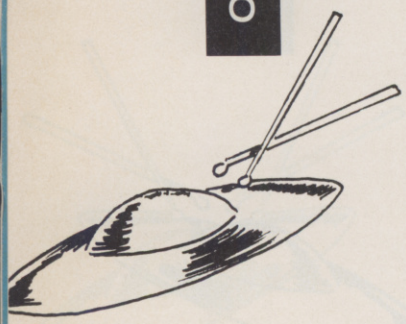
ERASE CURRENT PATTERN (TRASHCAN ICON)

Selecting this icon will simply erase the current pattern. There is no way of recovering a pattern so use with caution!

DISK/TAPE STORAGE OF PATTERNS (DISK ICON)

This option allows the storage and retrieval of recorded patterns on disk or tape. When this icon is selected, a bar will be displayed on the top of the screen with the words SAVE and LOAD. Select the operation of your choice with the pointer and press the button. You will now be prompted for a filename which should

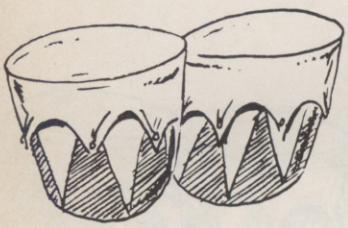




be no more than twelve characters, all pattern filenames are preceded by 'PAT.' This indicates that the file is a Drumsynth pattern file. Note: When loading stored pattern files you DO NOT need to enter 'PAT.', the computer will do this for you.

If the LOAD operation was selected then the computer will now access the disk (or tape) and retrieve the required file, restoring it into the original pattern slots. If SAVE was selected then two more prompts will appear:
FIRST PATTERN? (Any number between 0 and 255 which is the first pattern to be saved.)
LAST PATTERN? (Last pattern to be saved.)
The disk/tape will now be accessed, and all patterns between and including those specified will be saved.

If a disk error occurs during saving or loading operations, the error number and description will be displayed on the top line of the screen and the operation will be cancelled.



PLAYBACK OF SEQUENCE (PIANO KEYBOARD ICON)

This option is similar to the first one, except this does not just play one pattern, it plays the sequence created with the SEQUENCING PATTERNS option. Remember you must have created a sequence first!

Adding different sounds

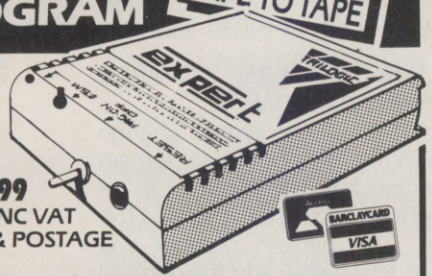
Lines 10010 to 10070 of the program contain parameters for the SID chip. Each sound is given a three character name and the eight parameters follow. These are: frequency low byte, freqency high byte, pulse width low byte, pulse width high byte, waveform (16,32,64 or 128), attack/decay, sustain/release and the filter flag (1 filter on, 0=filter off). The last three values define the filter, they are: cutoff frequency, resonance, and filter type. These parameters can be changed to create different sounds and to improve the existing ones.

Loading the program

To load Drumsynth outside the menu, just type LOAD "DRUMSYNTH",8 and RUN. Besides the program, the disk also carries a demonstration file called DRUMDEMO containing a number of rhythms for you to try out. You can load this using DRUMSYNTH's disk option.

BACK UP! TRANSFER! CONVERT! ANY PROGRAM

TAPE TO DISK
DISK TO DISK
DISK TO TAPE
TAPE TO TAPE



FOR ONLY
£29.99 INC VAT & POSTAGE

WITH THE AMAZING EXPERT CARTRIDGE NOW INCLUDING THE LATEST V.3 UPGRADE

- THE ONLY USER PROGRAMMABLE BACK-UP & UTILITY FOR 64/128 (64 MODE).
- EASY & CHEAP TO UPGRADE - JUST £3.50 FOR UPGRADE SOFTWARE ON DISK OR TAPE.
- FULL 64K M/CODE MONITOR.
- SCREEN & PICTURE PRINTER DUMPS.
- SPRITE EXTRACTOR & EDITOR.
- SAVES PROGRAMS IN ONE FILE (EXCL. MULTIPART ONES).
- SUPER EFFICIENT COMPACTOR - SAVE 3 OR MORE PROGRAMS PER DISK.
- TURBO RELOADER & DECOMPACTOR - RELOADS & RESTARTS PROGRAMS IN SECONDS.
- EXPERT NOT NEEDED FOR LOADING BACK.
  JOIN THE INTERNATIONAL EXPERT USER CLUB.

PLEASE STATE DISK OR TAPE SOFTWARE WHEN ORDERING.

TRILOGIC
Trilogic Dept. CDU., Unit 1,
253 New Works Road
Bradford, BD12 0QP. Tel. 0274 691115

FAST MAIL ORDER SERVICE · PROMPT DESPATCH · ALL PRICES FULLY INCLUSIVE PLUS 10 DAY MONEY BACK GUARANTEE ON ALL ITEMS. PAYMENT BY CASH, CHEQUES PAYABLE TO TRILOGIC BY POSTAL ORDER, ACCESS OR VISA. ADD £1 EXTRA FOR EXPORT ORDERS, PAYMENT IN STERLING ONLY PLEASE.

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, Argus Specialist Publications Ltd will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of this publication, summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £2,000 per annum for any one Advertiser so affected and up to £6,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts, or when the above procedure has not been complied with, at the discretion of this publication but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements). Classified advertisements are excluded.

ON THE DISK

C128 Pull-down Menus

Make your life user-friendly with this easy-to-use add-on routine for the C128

Pull-down menus are found on a large number of commercial packages and are very useful when a large number of options are required in an easy-to-use way. Presenting someone with even 20 menu options can be a bit daunting; imagine trying to include 50 options! By using pull down menus, the options can be presented in a more understandable fashion. When I started to write a word processor, I decided to use pull down menus and wrote the following short Basic subroutine. The subroutine has been changed so that it may be used on other software.

This routine will allow 6 pull-down menus to be used, each menu name being printed in reverse on the top line of the screen. The current menu name is printed in normal type (non-reversed). The menus are scrolled through by using the cursor left and right keys, and you select a menu by pressing the RETURN key. All other keys are ignored except for 'ESCAPE', which will exit the pull-down menu routine without selecting an option. This is the only way to exit without selecting a menu and an option.

Once you press Return the relevant menu is displayed on the screen. The menu is contained in a box which will show the same name as the menu bar. Each menu will contain up to nine options (this will allow a maximum of 54 options per set of menus).

Once the menu is displayed you will have two options available to you, one is to press the numbered key shown on the menu for the relevant option or to press Escape to exit the menu and return to the menu bar.

When an option has been selected two variables are set, OP - to indicate the menu used (1 - 6), and OP[- to indicate the option on the specified menu. If you use Escape to exit the menu routine both of these variables are set to zero.

How To Set Up Pull-down Menu's

As stated previously you can specify up to 6 pull-down menus on a single screen, each of these menus can have up to 9 options available. Obviously the menus and options have to be set up within your own software. This is done as follows:

Two arrays are required to define a pull-down menu screen.

AS(1-6)	-	The six menu names.
OPS(1-6, 1-9)	-	This is a two-dimen-
	-	sional array which is
	-	used to store the
	-	actual menu options
	-	in.
OPS(1,0) - OPS(6,0)-		Are used to store the
	-	number of options in
	-	each menu.
e.g.		
AS(1)	-	Menu 1, name,
OPS(1,0)	-	Menu 1, number of
	-	options.
OP9(1,1)	-	Menu 1, option 1
	-	(Max 30 characters).
OPS(1,2)	-	Menu 1, option 2.
AS(2)	-	Menu 2, name.
OPS(2,0)	-	Menu 2, number of
	-	options.
OPS(2,1)	-	Menu 2, option 1.
etc...etc...	-	

Once these two arrays have been set up you can call the pull-down menu routine. If your software requires more than one set of menus you can change the content of the arrays and then call the routine again.

Variables used by Pull-down Menus routine:

Variable Name	:	Variable Function
A1$-A5$	:	Used to draw menu box
	:	screen.
A$	:	Used in GETKEY routine.
AS()	:	Menu names.
BS()	:	Menu names with spaces
	:	added for highlight bar.
CL$	:	Cursor left character.
CR$	:	Cursor right character.
HO$	:	Home character
OP	:	Current menu option on
	:	screen (1-6).
OPS()	:	Menu data
OP%	:	Option on menu selected.
R1$	:	Reverse print on character.
R2$	:	Reverse print off character.
S1$	:	String of 10 spaces.
S2$	:	String of 4 spaces.
X	:	Used on For/Next loops.

I have included a short demo program, WINDEMO, to show you how to set up and use the routine in your own software. I have not included options for all of the menus but you should be able to see how to incorporate the routine into your own software.

Tokeniser

Wouldn't it be nice if you could edit and enter your Basic programs with all the facilities of a wordprocessor at your disposal? Well, now you can...

By P F Hayes

As you probably know, C64 Basic is stored in memory in a tokenised form - that is, Basic keywords are reduced to single bytes for reasons of speed and space-saving. (See our article, Inside Basic, for more on this topic.) This means that a Basic program file cannot be read into a wordprocessor, such as Superscript, directly.

There is however a way of producing a sequential, ASCII, Basic file. This is exactly what you do every time you list a Basic program to the printer. If you can redirect this stream of bytes to the disk then an ASCII file can be produced. It can be done, and here are the lines that will do it.

```
OPEN 8,15,8,"0:filename,S,W"
CMD8
LIST
CLOSE8
```

will produce exactly such a file, which can be loaded into the wordprocessor of your choice.

OK, so you've loaded the file, modified it, and saved the revised copy. Now comes the hard part. How on earth can you turn the sequential file back into a Basic program? Until now, you couldn't. But this is exactly what Tokeniser does.

Besides Tokeniser, I have provided a simple editor, Editfile64 for those who don't own wordprocessors.

BASITOK: The basic tokenisation routine

Basitok provides a unique and original facility for converting a sequential program text file listing (as created with the Basic Editor) into a Basic program listing, which can then be executed by the C64 Basic interpreter.

The program works by loading the basic file listing into memory and swiftly converts it line by line into a basic program, which can then be executed or saved as in the normal way.

In order to carry out this operation, use is made of a m$c routine (placed above Basic at $C000 to $C0D5) which performs the following tasks:-

1. Reads the sequential program file listing from disk or cassette and stores it in Basic memory upwards from $1100, thus allowing approximately 36k of text listing to be read in.
2. Reads the sequential listing line by line from memory and tokenises each line in turn into a basic program line.

Use is made of the fact that the length of each tokenised program line is less than the corresponding sequential listing line. As each line is tokenised (starting from memory address $0801) it builds up into a Basic program which, if greater than 6k will overlay the sequential listing in memory, allowing approximately 30k of Basic program to be created.

Using the BASITOK program

Basitok is primarily intended to convert a sequential Basic program file listing (as created using the Basic Editor) into a Basic program file which can be executed by the C64 Basic interpreter. In addition, Basitok can also operate on any Basic sequential file listing. This option is discussed in the Applications section.

Before loading the program into memory it is wise to reset your C64. This can be achieved by a system cold start (SYS 64738). Once the program has run, the user is requested for a valid sequential program file name, and an input device: disk (D) or cassette (C).

The program then automatically loads the sequential text file listing into memory and converts it line by line on the screen into a Basic program, which can be subsequently saved or executed.

Line numbers

The operation of Basitok does not require text file line numbers to be stored in any particular order. This is especially useful when using the Append option of the Basic Editor Save command. With this option program lines can be appended in any order to a disk file. Basitok will accept this format and convert the file into a Basic program as shown previously.

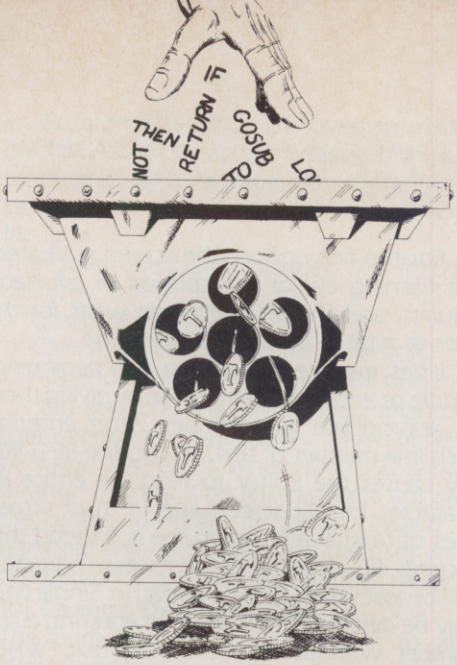
Editfile64 is a complete Basic Program File creation and development system for the C64. It consists of a package of two programs.

The first program - the "BASIC EDITOR" - is a powerful program file editor enabling the creation, modification and storage of Basic programs in sequential file format on disk or cassette.

The BASIC EDITOR

The Basic Editor provides powerful and convenient facilities for entering, editing, printing and storing numbered basic program lines.

The Editor retains features of the C64 Basic



Screen Editor, but also includes many useful new facilities to aid Basic program development.

To this effect Basic Editor allows the user to save or append all or any part of a basic program file to disk or cassette. Saved files can later be loaded into memory, or merged with a file currently in memory. Lines from a file which is being merged into another currently in memory, may be numbered so that they either fall into the present body of a program file, precede it, follow it or overwrite current lines. If two programs have the same line numbers then the new program lines will overwrite the old.

The Editor allows the current input/output device number to be changed, thus enabling all or part of a file to be listed to device 4 (ie printed), or saved to device 8 (disk) or device 1 (cassette). The "Search for string" command will search through all or part of the program file for a string, word or command, and will list every line in which it occurs. The "Edit File" facility, conveniently, will allow a block of lines to be edited, created or deleted using the full screen, and will thus allow a range of line numbers to be viewed during the editing session. The current disk directory can be displayed on the screen at any time using the "Directory" command.

Program files on which the Editor operates are made up of CBM ASCII characters, each line being terminated by a carriage return. The files are stored on disk or cassette as sequential files and will show as file type SEQ.

With the Basic Editor program residing in memory, approximately 28k is free for data. This is mainly allocated to an arbitrary 300-element array for Basic program lines, each line being allowed a maximum length of 80 characters by the Editor program. (The length of a line of Basic text is limited to 80 characters displayed on the screen, as with the C64 Screen Editor.) Although the maximum field length is 80 bytes, this would probably not be used for all basic lines, and because string storage is dynamic, this field length would not be immediately allocated. The number of lines can be increased easily by up to two or three times. Details on how to extend the program will be given in the Applications section.

The input of lines to Basic Editor is managed by a small m/c routine placed above Basic at $C000-C07A. A disadvantage of the Commodore 64 Input routine is that not all characters can be read in by this command. If an input variable contains either a comma, semicolon or colon, C64 Basic treats it as a separate character; the remainder of the variable is ignored and the next Input statement continues reading past the next carriage return (CHR$(13)).

This limitation is detrimental to Basic text file development, as these characters are used extensively throughout a Basic program. To overcome these disadvantages, the input m/c routine simulates, but improves upon the C64 Input routine through the additional ability to read commas (,), semicolons (;), and colons (:).

Using the BASIC EDITOR Program

Once the program has run, the user is then presented with the main menu which lists twelve available command options. As certain command options result in irreversible actions, confirmation of the operation will be requested before the command is executed.

We will deal with each command in turn:

1) Exit From Editor

The Exit command causes the Editor to disengage and return to the C64 Basic Screen Editor, clearing all variables, arrays and available ram, with the exception of the Basic Editor program.

2) Re-Initialise Program

This command sets up the necessary variables, the main file array, and function definitions for handling a new file. Calling this option when a file is already in memory will result in the loss of the existing file. After re-initialisation, control is returned to the main menu.

3) Load File

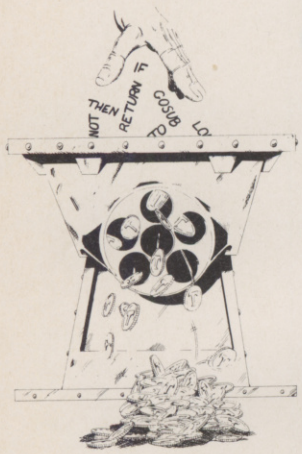
The Load File command will read the contents of a specified basic source text file from disk or cassette into memory. The command is intended to be used when loading a file into the Editor from scratch, with no other file currently in memory. Calling this option will result in program re-initialisation (and loss of any current file in memory).

This procedure differs from the Merge/Append File command (see (8)) in that with no other file in memory, the line positions of the incoming file have already been determined, and each incoming line is stored in the File array sequentially after the last.

4) Input Line(s)

When this command is selected the user is presented with two options for inputting line numbers: either by giving them a specific line number, or by using the auto line numbering facility.

▶ ▶ ▶ ▶ ▶ ▶ ▶



For the first option, the screen is cleared, the flashing cursor is displayed in left-hand column, and the program then waits for the user to type in a Basic program line.

Lines may be inserted at the beginning, middle or end of an existing file by giving them an appropriate line number. After entering each line number of text, hitting the RETURN key causes the Editor to read the entire 80 character logical screen line (ie two screen lines of text). If a program line is entered that exceeds 80 characters, the excess characters will be lost when the line is read in. Single lines may be deleted in this mode by entering a line number without any following text. When entering a line number of text, Basic Editor simulates the C64 Screen Editor by allowing "Keyword abbreviations", "Quote mode" and "Insert mode" facilities to be used.

The Auto line numbering option allows the user to select the initial line number and line number increment. The screen is then cleared and the requested line numbers automatically generated. The Auto line numbering facility allows lines to be entered in a similar fashion to the Single line input option, with the exception that single lines cannot be deleted in this mode.

To exit from Input mode and return to the main menu, type in a Left Arrow (←) key as the first character, and hit the RETURN key.

5) List Line(s)

The list command allows the user to look at the lines of the Basic program currently in memory, allowing all or part of the program to be displayed to the default output device. The listing will normally be directed to the screen, but by selecting the output device number to 4 (see (10) for changing device number), the output will be switched to the printer. The List commands works in the same manner as the List system comand in C64 Basic.

On selecting this option the user is requested for a range of line numbers (LN1-LN2), where LN1-LN2 specifies a range of lines (eg 100-500).

Valid parameters include:

'LN1' which will list line LN1.

'LN1-' which will list all lines from LN1 to the end.

'-LN2' which will list all lines from the beginning up to and including LN2.

'LN1-LN2' which will list all lines from LN1 to LN2 inclusive.

If no line numbers are given (ie by pressing RETURN when the prompt appears), the entire program is listed.

Whilst the program is listing to the screen, the "scrolling" of the display from the top of screen to bottom can be halted by hitting the "P" key. Scrolling can be resumed by hitting the same key again.

Once the listing has been completed, hit the RETURN key to return to the main menu.

The above format for specifying a range of line numbers (LN1-LN2) will be used throughout the documentation.

6) Delete Line(s)

The Delete command allows the user to delete any number of lines at a time.

Simply enter the range of lines to be deleted (LN1-LN2), where LN1-LN2 specifies a range of lines. If no line numbers are given, the entire program is deleted. Single lines can also be deleted in Input mode (see (4)), or Edit File mode (see (7)).

7) Edit File

The Edit File command provides the user with powerful and convenient facilities for editing the program text.

This option will allow a block of lines (to a maximum of eleven) to be edited, created, or deleted using the full screen, thus allowing a range of line numbers to be viewed during the editing session. In addition, the whole file can be examined, conveniently, for editing with the use of fifteen powerful edit control commands.

On selecting the Edit file command the user is requested for an initial line number (LN1) from which editing will commence. If an invalid line number is entered this will be flagged, and the user requested for another line number or the option to exit to the Editor menu.

The screen will then display the first eleven lines from LN1 onwards. (If there are less than eleven line numbers to the end of the file, these only will be displayed). The cursor will be positioned initially at the first line number and will start to flash more quickly. Editing can now commence, the keyboard being scanned to check whether a key is being depressed.

The following cursor/edit control key commands are available:

Once the selected section of the program text is listed to the screen, the cursor/edit control keys are used to move around the screen so that the user can make any appropriate changes.

If the character entered is not one of the cursor or edit control keys, then the character is added into the line at the cursor position, overwriting the previous character underneath the cursor. The edited line is then reprinted to the screen.

If the character entered is a double-quote mark ("), the Editor operates in the Quote mode, and cursor keys are treated differently to their normal mode of handling. In this mode characters are entered normally but the cursor controls no longer move the cursor. Instead, reverse characters are displayed which represent the cursor control being entered. The same is true of the colour control keys. The [DEL] key is the only cursor not affected, and can be used to correct errors whilst in the Quote mode. Quote mode can be cancelled by entering a second double-quote character.

After making all the desired changes to a

specific line number of text, hitting the RETURN key anywhere on the line causes the Editor to read the new program line, and save it into the file array. The screen display is then updated to reflect the new changes.

Each program line is allowed a maximum length of 80 characters. If an 80-character line is created, the program will not allow any more characters to be inserted into the line. If further changes to the line are required, the delete key has to be used first.

New lines can be inserted into the file array simply by overwriting any displayed line number with a new line number, making the appropriate changes to the text, and hitting the RETURN key. Lines can be deleted from the file by deleting all the text from the particular line (leaving only the line number displayed), and hitting the RETURN key.

After making all the desired changes to the current screen display of line numbers, the program file can be paged forwards or backwards eleven lines at a time by using the [F1] and [F2] keys respectively. Program text editing can then re-commence on the new display of line numbers.

8) Merge/Append File

The Merge/Append command allows the user to merge or append a program file saved on disk or cassette to a file currently in memory, providing that the maximum file length is not exceeded (this is arbitrarily set at 300 lines). Lines from a file being merged or appended to a file currently in memory, should have been previously numbered so that they either fall into the present body of a program file, precede it, follow it or overwrite current lines.

The advantage of this facility is that programs can be built up in modular form from previously saved program subroutines. On selecting this option the user is prompted for an input device number (disk=8, cassette=1) and a valid file name.

9) Save File Line(s)

The Save command is used to store the file that is currently in memory. Save has the ability to output all or part of the memory resident file to the output device. (disk or cassette.)

Program files which are saved are made up of CBM ASCII characters, with each line being terminated by a carriage return. The files are stored as sequential data files and will show as file type SEQ.

The Save command includes the following options:

a. Create a new file
b. Overwrite an existing file (disk only)
c. Append to an existing file (disk only)

On selecting the Save File command, the user is requested for a range of line numbers to be saved (LN1-LN2), where LN1-LN2 specifies a range of lines. If no line numbers are given, the entire program is saved. Invalid line numbers will be flagged and the user will be prompted for another line number range.

10) Change Device Number

The purpose of this command is to allow input/output to be made to disk (device =8) or cassette (device=1), or output to printer (device=4). It is important to note that trying to output - or input from - a device which is not present, or to input from a device which is not capable of giving an input (eg printer), may result in the program stopping.

11) Search For String

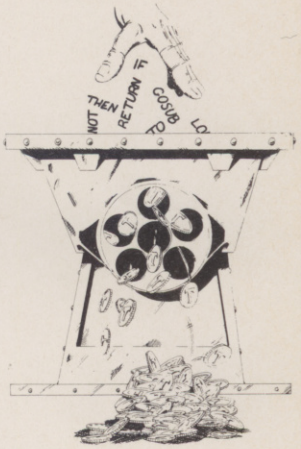
On selecting this option the user is requested for a range of line numbers that are to be searched (LN1-LN2), where LN1-LN2 specifies a range of lines. If no line numbers are given, the entire program is searched.

You are then requested for a search string. As the string operation is being carried out the number of lines found and the total number of lines scanned will be displayed. Once the search routine has completed, the lines containing the search string will be listed on the screen.

The "scrolling" of the display from the top of screen to bottom can be halted by hitting the "P" key. Scrolling can be resumed by hitting the same key again.

12) Directory

This command will read the disk directory and display it on the screen. This is a particularly useful utility if the user cannot remember a file name and did not wish to exit from the main program.



Mnemonic	Keypress	Function
[CUP]	SHIFT & CRSR up/down	Moves cursor up one line.
[CUD]	CRSR up/down	Moves cursor down one line.
[CUL]	SHIFT & CRSR left/right	Moves cursor once space to left.
[CUR]	CRSR left/right	Moves cursor one space to right.
[INS]	SHIFT & INST/DEL	Inserts space to right of cursor.
[DEL]	INST/DEL	Deletes character to left of cursor.
[F1]	f1/f2	Pages forward eleven lines.
[F2]	SHIFT & f1/f2	Pages backwards eleven lines.
[F3]	f3/f4	Moves cursor to beginning of first line.
[F4]	SHIFT & f3/f4	Moves cursor to beginning of last line.
[F5]	f5/f6	Moves cursor to beginning of line.
[F6]	SHIFT & f5/f6	Moves cursor to end of line.
[F7]	f7/f8	Edits from the Editor
[F8]	SHIFT & f7/f8	Re-enters Edit subroutine.
[RETURN]	RETURN	Saves current line into File.

Computer Aided Designer

Computer-Aided Design is used for everything these days, from designing electronic components to frocks. With this super-friendly package, you too can get in on the act.

CAD package - the letters stand for Computer-Aided Design. It was originally written with the layout of electronic circuits in mind, but can be used for a wide range of design activities - anything that requires the fast assembly of pre-designed components.

When you first load the program, the screen should show a design grid.

In the middle of the grid there is a white square, the CURSOR, and in the squares down each side of the grid there are letters that represent modes.

The joystick needs to be in control port 2 of the computer. It is with this that you move the cursor.

If you press the control key on the computer, in the user message area (in the lower half of the display appears a brief description of four other modes accessed by the function keys. Press the control key again and a description of the other four function keys and four more modes are displayed. Pressing the Control key repeatedly will alternate between these two displays. The Control key is also used to exit from a Mode. There are two types of Mode:

Screen mode:

The letters down either side of the grid are abbreviations for the following:

G1	: grid 1	TR	: transfer
GR	: grid rearrange	DL	: delete
RT	: rotate	LK	: link
MR	: mirror	DE	: design
IV	: invert	NG	: next grid

Each represents a screen mode except G1 (grid 1) which is a label to tell you which grid you are currently on.

A screen mode is selected by moving the cursor over the square containing the abbreviation for the required mode and pressing the joystick fire button.

Keyboard mode:

The function keys represent the keyboard modes. In order to select a keyboard mode press and hold down the required function key. There is a delay on selecting a keyboard mode to prevent rapid screen changing.

There are two ways of selecting a mode:

While not in a mode:

When having first loaded the program or when the control key has been pressed you can directly access any mode.

While in a mode:

When in a mode you can access another mode (change modes) directly without having to exit the mode you are currently in.

This is subject to restrictions, though:

(a) When in a screen mode (except design mode) you can access any keyboard mode by pressing and holding the required key.

(b) When in a screen mode you can access another screen mode when a grid screen is being displayed.

(c) When in a keyboard mode you can access a screen mode when a grid screen is being displayed.

(d) When in a keyboard mode you can access other c/u keyboard modes provided you are on the first menu of the current keyboard mode and no access is being made to the disk drive or printer.

The modes will each be explained in turn starting with the screen modes. In order to get started there are a few already designed electronic circuit components on the supplied disk. The disk needs to be in the disk drive, press and hold down the shift key and function key 1 (ie function key 2) until the grid disappears, so as to load the boot file on the disk. The boot file will be explained later.

Once loaded the grid will reappear with some components in it. The blank squares are spaces where you can put more circuit components.

The screen modes

GR: Grid rearrange

Move the cursor over the square containing the letters 'GR' and press the fire button. Some text appears in the user message area of the display instructing you to select a component. In order to select a component the cursor needs to be placed over a component, and the fire button pressed. Some more text then appears in the user message area. Move the cursor over a blank square and press the fire button. A copy of the component you selected will appear in it and the first message will reappear.

RT: Rotate

Move the cursor over the square containing 'RT' and press the fire button. As in the previous mode a message will appear. Move the cursor over a component and press the fire button. The component rotates 90 degrees to the right. The cursor still over the component press the fire button again and the component will rotate again.

MR: Mirror

This mode will mirror the component selected down its centre axis. Position the cursor over the square containing 'MR', press the fire button and a relevant message will appear. On

By Roger Peachey

pressing the fire button when the cursor is located over a component will be mirrored.

IV:Invert
Select invert mode, then select a component. Invert mode turns the selected component upside down.

TR: Transfer
Select transfer mode and then a component. On selecting a component the Circuit screen appears with the component you chose in the middle of the screen. The component can be moved via the joystick. Move the component and position it, then press the fire button to place it. The grid screen will reappear. Select another component and when the circuit screen appears, it will have the previous component where you positioned it.

DL: Delete
On selecting delete mode the circuit screen appears with a filled-in square in the middle of it. Place the square over one of the components you put on the circuit screen and press the fire button. On moving the square the component is no longer on the circuit screen. It has been deleted. Press the control key to exit delete mode and return to the grid.

LK: Link
On selecting link mode the circuit screen appears with a cross in the middle of it. Place the cross in a relevant position, press the fire button and a smaller cross will appear. Move the large cross to a new position and press the fire button and a line is drawn between the two selected points. Press the control key to exit link mode and return to the grid.

DE: Design
Select design mode and then a blank square. The design screen will appear consisting of a design grid with some text alongside it.

In the top left hand corner of the design grid is a cursor which can be moved with the joystick. On pressing the fire button the point under the cursor will be inverted, therefore having started with an empty design grid the point will be turned on. Press the fire button again to turn the point off.

If with the fire button held pressed down you move the cursor each point that the cursor moves over will be inverted. If you stop the cursor but keep the fire button pressed and then move the cursor again in a different direction the same will happen. Stopping movement but keeping the fire button pressed does not cancel the continuous plot/unplot facility.

Once you have designed a component press the return key (The only way to exit design mode). The component you designed can be seen in the square you selected previously. The message to select another component is in the user message area. Select the component you just designed. The design screen will reappear with your components already in the design grid. If you press the Shift and Clr/Home keys together the design screen is cleared. Pressing return at this point will erase your component from the grid. The component you design is only cleared from the design grid. Press the Clr/Home key on its own and your component will reappear in the design grid.

It is possible to modify a design but keep your original in case of error whilst making alterations. The original design needs to be stored in the grid (by pressing the Return key) and any modifications made. In case of error the original design can be restored to the grid by pressing the Clr/Home key. The final design is saved to the grid when you press the return key.

NO: Next Grid
There are two grid screens and one circuit screen in the computer's memory at any one time. So far you have seen only one of the grid screens. The grid screens are where your choice of components with which you can design a circuit are located. In order to see the other grid screen move the cursor over the square containing the letters 'NG'. On pressing the fire button the second grid screen replaces the first. Notice that the letters in the top left-hand square change from 'G1' to 'G2' to inform you that grid 2 is now on display. This is required so you can specify which screen you wish to load/save, which will be discussed later.

This mode can be used when not in a mode or when in a mode, but unlike the others it will not cancel the mode you are in.

As an example, select Grid rearrange mode by moving the cursor over the letters 'GR' while on grid 2 and pressing the fire button. Select a component from grid 2 by moving over the component and pressing the fire button. There should be some components on grid 2 loaded via the boot file earlier. Instead of selecting a blank square on grid 2 move the cursor over the square containing the letters 'NG' to return to grid 1. Select a blank square on grid 1 and press the fire button. A copy of the component selected from grid 2 has been put in the square selected on grid 1, and you are still in Grid rearrange mode.

(Note that, when on the circuit screen in either transfer, delete or link modes, the speed of the cursor (whatever form) can be changed.

▶ ▶ ▶ ▶ ▶ ▶ ▶

Only two speeds are allowed: fast or slow. The speed required, or preferred, is selected by pressing the plus (+) key for fast or the minus (-) key for slow whilst on the circuit screen in any of the above-mentioned modes.

Keyboard modes

F1: Hard copy
Select hard copy mode by pressing and holding down function key 1 until a menu appears on the screen. The menu asks which screen you wish to printout. Select the required screen by typing the relevant number that is alongside your choice in the menu and by pressing the return key afterwards. The next menu that appears asks what size of print-out you would like, either large or small. If you select the large print-out the perforation line on your paper needs to be just above the print head. Enter your choice, a prompt asking you to check what you have entered will then appear. If you decide NOT to proceed type 'N' followed by the return key and the first menu will reappear. If you decide to proceed type 'Y' followed by the return key and the printer will begin the printout.

Once complete the first menu will reappear.

F3: Disk mode
Disk mode is selected by pressing and holding down function key 3 until a menu appears. A menu will appear with three items on it. The first two will be explained together followed by the third.

LOAD OR SAVE On selecting either the load or the save option from the menu a second menu will appear asking you to enter what screen you wish to load or save. Select the required screen, then a prompt for what the file is called or what you want to call it will be displayed. A filename is limited to eight characters, typing a ninth character - if not the return key - will erase what you have already typed. Once the filename is entered you will be asked to check your request, you can then either return to the first menu or proceed to load/save the selected a screen.

CREATE A BOOT FILE The boot file is a file containing the names of all three or just one of the screen files. This is to save time, so that you don't have to load each screen individually before you can start designing. The boot file must be created before you can start designing screens. The boot file also saves the current screen colours. On selecting this option you will be confronted with three successive prompts, one for the filename of each screen. If you don't wish to include all the screens in the boot file just hit the return key at the relevant prompt to miss that screen out. Naturally if you press the return key at all three prompts you will be returned to the first menu.

The files all need to be on the same disk and the disk currently in the drive. On completion of the three prompts you have the option of continuing or not. If you proceed, the boot file will be saved to the disk.

F5: Clear Screen
Select this mode, and a menu will be displayed asking which screen you want to clear. On completion of this menu the option of continuing is displayed. If you continue, the chosen screen will be reset, wiped beyond recovery.

There is a slight pause while the chosen screen is cleared.

F6: Colour change
Select this mode and the grid display is shown with the border of the text screen as well as the grid screen. This is so that any colour change made can be seen on the display.

In the user message area are six abbreviations, (arranged in two rows of three), one for each of the areas of colour. The one that is printed in reverse type is the one whose colour can currently be changed. The colour is changed by pressing the spacebar.

The next area you wish to change the colour of is selected by the keyboard cursor keys. The cursor right key will move the reverse type cursor to the right. The cursor down key will move it down. Once at the end of a row the cursor will move to the front of the row if the cursor right key is pressed, and at the end of a column the cursor down key will move the cursor to the start of the column.

There are restrictions on the colours, for example, you cannot have the cursor colour the same as the colour of the area it is displayed on.

The abbreviations displayed represent the following:

CBORDER: The colour of the circuit and grid screens border.
TBORDER: The colour of the text screen's border.
COMPONENT: The colour of the grids and the components within them.
COMPBACK: The background colour of the grid and design screens.
CURSOR: The colour of the cursor and any text.
TEXTBACK: The background colour of any text.

F8: Exit program
Selecting this mode will display a prompt in the user message area of the grid screen display. The prompt asks you if you wish to exit the program. If not then the prompt will disappear. If you do wish to exit the program the screen will blank and the computer will reset to the display which is present when the computer is first switched on.

Loading the program

To load the program outside the menu just type LOAD "C-CAD",8 and RUN.

F7: Component label
In this mode you can label your design and/or put component values in. On selecting this mode the design is displayed with a square text cursor at centre screen. This cursor is moved via the keyboard cursor keys.

The cursor first of all needs to be positioned, then type what you wish on the keyboard and it will be put on the circuit screen. The text is in lower case, for upper case use the shift key and the required letter together.

The cursor moves a character at a time with the cursor keys. It can be moved a pixel at a time left though with the left arrow key (next to the number '1') and a pixel up at a time with the arrow up key (next to the 'restore' key). These two keys do not have the character repeat quality.

On reaching the border whilst typing the cursor does not advance or move to the next line, any character typed will be present under the cursor. The delete key will not work, to delete a character type a space over it.

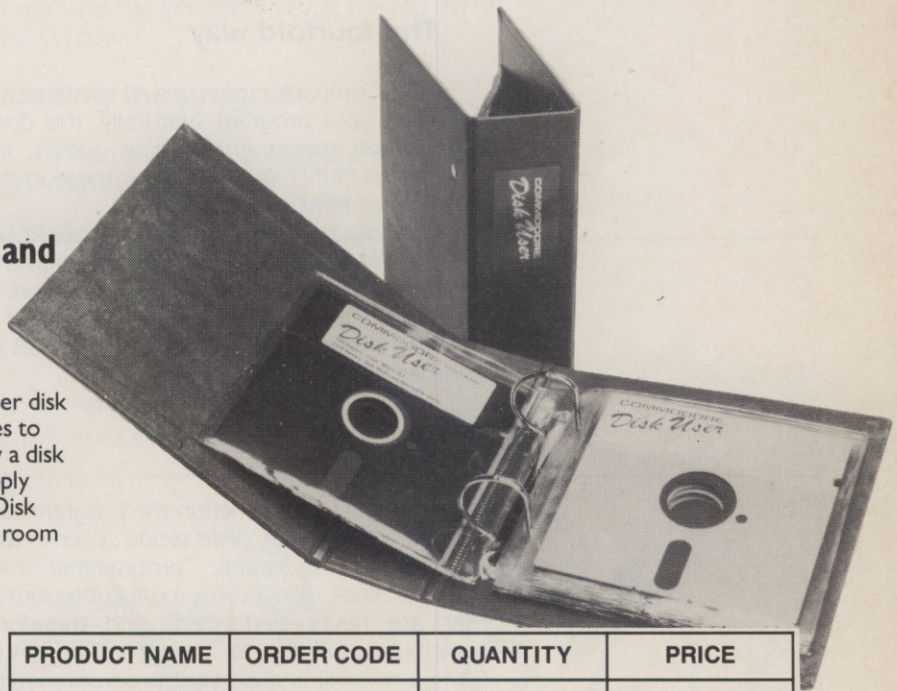
F2: Load boot file
Place the disk containing the boot file in the drive before selecting this mode.

Select this mode by pressing and holding down the shift key and function key 1 together until the grid screen disappears. The boot file is loaded and then each file whose name is present in the boot file. A message indicating the current action being taken will appear on the screen. Once loaded the grid screen will reappear.

F4: Disk directory
Place the relevant disk in the drive and then select this mode. The directory of the disk will be displayed on the screen. The directory can be halted and restarted by pressing the space bar.

Binders

Organise and protect your disk with Commodore Disk User disk binders and data disks.

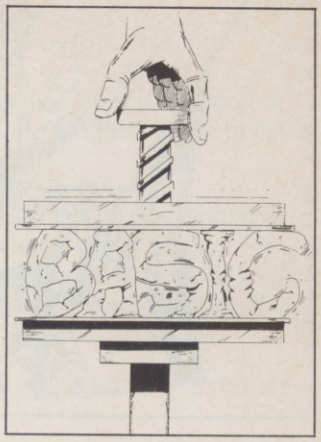


Why not keep your Commodore Disk User program collection alongside your magazines in a stylish Disk User disk binder? The binder comes complete with 10 disk sleeves to organise and protect your program disks. Why not buy a disk binder to house all of your data disks? We can even supply Commodore Disk User data disks. The Commodore Disk User logo immediately identifies your disks and there's room to title them and document the disks details.
Send for your disks and binders now!

Prices are as follows:
Commodore Disk User Binder £4.95, including 10 sleeves. Order code **BDYU1**
Commodore Disk User Binder with 10 sleeves and 10 disks, £9.95 Order code **BDYU2**
10 sleeves for insertion in binder, £1.50. Order code **BDS10**
20 sleeves for inclusion in binder, £2.75. Order code **BDS20**
10 Commodore Disk User data disks, £5.95. Order code **BDD10**

PRODUCT NAME	ORDER CODE	QUANTITY	PRICE
Overseas postage add £1.00			
		TOTAL	

Basic Compactor



Every now and then, your Basic programs may get just that little bit too big. Cut them down to size with this 'giant-killer' program

By Fin Fahey

All Basic programmers are faced with conflicting requirements. The ideal Basic program should be fast, as small as possible - and understandable to human beings, should you or anyone else be required to change it at any point. Obviously these requirements cannot be easily reconciled - REM statements, which make programs comprehensible, add nothing to their functionality, for example.

Basic Compactor is the answer. This handy little program performs one or all of four different functions on your Basic program, which may well give you that extra little bit of space you need to complete your programming project.

The fourfold way

First, Compactor removes all unnecessary spaces in your program. Naturally, this does not include spaces enclosed in quotes, for example in PRINT statements, or those in the text part of REM statements.

Secondly, the program can eliminate REMs - both REM lines and REMs appended to the end of functional lines by means of a colon. It doesn't do this indiscriminately though. If a REM is referenced by a GOTO or GOSUB in another line, it is not removed.

Dead wood

The third useful function the program can provide is to remove 'dead wood'. Even in the best-planned programs, programmer can overlook lines, and even whole subroutines, that are never performed, and therefore contribute nothing to the program. Basic Compactor will analyse your program's logic, seek out these 'dead' areas, and eliminate them.

Finally, not a lot of people realise that a functional Basic statement can be up to 255 characters long. This is not surprising, since you can only enter 80 characters into a Basic line on screen. Compactor offers both 'short' and 'long' compaction of Basic lines. In both cases the idea is to compress as many statements into one line as possible. Every line number eliminated in this way saves four bytes(if you want to know why, see our article on Basic).

Short compaction seeks to keep the line length as close to an enterable size (80 bytes) as possible. Long compaction goes for the full 255 bytes per line.

Freedom of choice

Basic Compactor's main menu gives the ability to choose one of these functions or all at once. It reads:

1 REMOVE SPACES
2 REMOVE REMS
3 REMOVE REDUNDANT LINES
4 SHORT LINE COMPACTION
5 LONG LINE COMPACTION
6 TOTAL COMPACTION - SHORT
7 TOTAL COMPACTION - LONG
8 RETURN TO BASIC

If you are running the compaction functions individually, bear in mind that you should remove 'dead wood' before compacting lines. In some circumstances such redundant lines may be incorporated into compacted lines, after which Compactor cannot remove them.

Just press the appropriate number key to get a given function. Above the menu is a line which will always tell you the current program size in both lines and bytes. There is one limitation to Basic Compactor - it will not compact programs larger than 1024 lines - I do, however, have a feeling that this will not prove to be a major problem.

LOADING THE PROGRAM

To load Basic Compactor outside the disk menu, type LOAD "COMPACTOR",8,1. The program resides at address 49152(SC000) and the menu can be invoked at any time by entering SYS 49152. Compactor uses a number of page zero locations also used by Commodore Basic. This should not prove a problem. However if your Basic program will not RUN immediately after compaction, then simply SAVE it, turn the machine off and on, reload and try again.

Santolus

Can you penetrate to the depths of the dread space station orbiting the sinister planet Santolus?

By George Allan

Santolus space station - a known hotbed of subversive anti-Terran activity. Small wonder then, that you, Earth's most intrepid space jockey, have been selected to go in and clean out this nest of alien war machinery. The problem is that Santolus station is a maze filled with hostile devices. Frankly, you haven't got a snowflake's chance of getting in and out alive. But, chin up, shoulders back - you might as well try...

A maze of death

The game presents you with a view of the maze seen from above. Using a joystick in Port 2 you have to shoot your way through a number of obstacles in order to reach the alien mothership at the end of the maze. Kill this by shooting into its power ball - if you get that far... The problem is that alien defenders will be trying to stop you. Your ship can absorb a certain amount of punishment, as it is composed of three modules, but as more and more of your ship modules are destroyed, your laser's range and rate of fire will diminish. You have three lives altogether, giving you the ability to absorb nine hits.

The bar below your present score shows your current laser power. This can be replenished by shooting up a box with ST on it.

A number of objects can be collected for extra points and to replenish your strength. To pick these up just go over them. They are:

CL - Colour bomb. Collect this for extra points.
Key - You may need this to open doors.
ST - Shooting this will replenish your laser shield.
SR - Collecting this gives you back one ship module.
F - Colliding with this will slow your ship up, making you more vulnerable.

Lots of objects will simply destroy your ship on contact. Some of these can be dispatched using your laser.

To pause the game press INST/DEL, and to restart use the left arrow key at the top left of the keyboard.

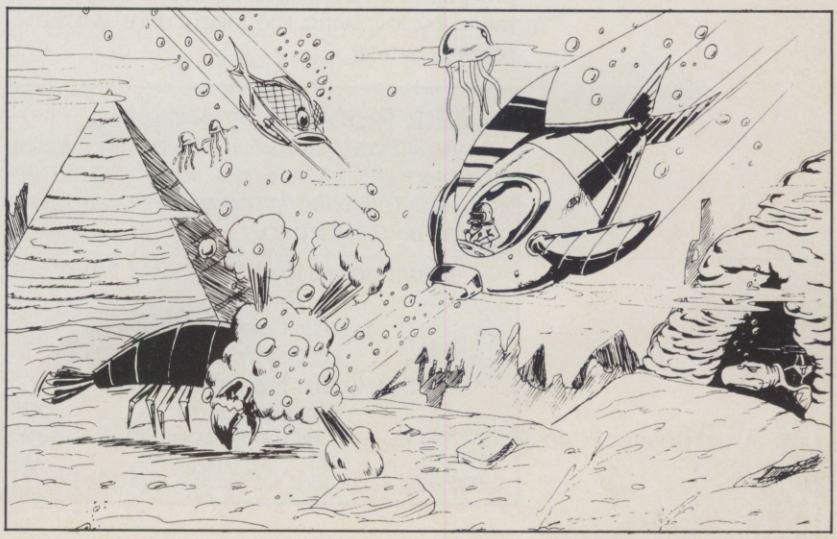
Loading the program

To load the game outside the menu, type "SANTOLUS",8 and RUN.

Atlantis

The depths of the Atlantic are vast, and so is this game - you won't blast your way through it in an afternoon!

By B.N. Lewis



Atlantis - the fabled and feared lost continent. At last, the quest of a lifetime is finished and you are free to explore the cyclopean ruins of lost cities at your leisure.

Except that life isn't that simple. Atlantis teems with cybernated creatures of all sorts, and it'll take all your expertise and the power of your mini-sub to win through to the final secret.

Atlantis was produced using the Shoot-'em-up construction Kit from Outlaw/Palace Software, which we reviewed two issues ago. Just shows that you don't have to program in assembler to get a program in CDU!

DISK INSTRUCTIONS

Before you use your disk for the first time, read this.

We have done our best to make sure that Commodore Disk User will be compatible with all versions of the C64 and C128 computers and their associated disk drives.

Getting the programs up and running should not present you with any difficulties at all, simply put your disk in the drive and enter the following command:

LOAD "MENU",8,1

Once the disk menu has loaded you will be able to start any of the programs simply by pressing the letter that is to the left of the program that you want to use.

C128 users please note that you should be in C64 mode when using the disk. You can enter C64 mode by either:

i) Holding down the Commodore key (bottom left of the keyboard) when turning the computer on or,

ii) After turning the computer on type G064 and answer "Y" when prompted "ARE YOU SURE?".

It is possible for some programs to alter the computer's memory so that you will not be able to LOAD programs from the menu correctly until you reset the machine. We therefore suggest that you turn your computer off and then on before loading each program.

Copying the programs

The disk is not protected in any way so you can copy the programs onto your own disk should you wish. A file copier, that to our knowledge will work with all drives, is included on the disk for this purpose. All of the programs can be loaded independently of the menu by following the instructions with the relevant article.

Disk Problems

Should you have problems loading any of the programs on the disk DO NOT return them to the editorial office. All faulty disks should be returned to:

Commodore Disk User Vol 1 No 4
Returns
Disk Copy Labs
20 Osyth close
Brackmills Industrial Estate
Northampton
NN4 ODY

and a replacement disk will be sent to you.

How to copy CDU files

You are welcome to make as many of your own copies of Commodore Disk User programs as you want, as long as you do not pass them on to other people, or worse, even sell them for a profit.

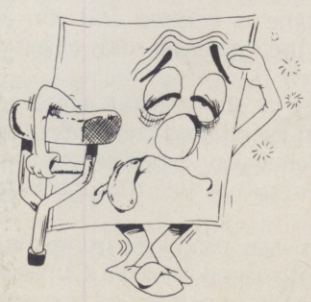
For people who want to make legitimate copies, we have provided a simple machine-code file copier. To use it, simply select the item FILE COPIER from the main menu. The copier works with a single drive, is controlled by means of the function keys as follows:

F1: Copy file - the program will prompt you for a filename
F3: Resave the memory buffer - you may get an error on a save (perhaps you left the drive door open). Use this to try again.
F5: Disk commands - allows you to enter any regular C64 disk command
F7: Displays the directory
F2: Exits the program and returns you to Basic.

Apologies

The gremlins have been at us with a vengeance. First, in issue 2, we left out one file from Text Cracker, one of the disk programs. This file, which the program needed to run, was to have been included in our last issue, but somehow the wrong file appeared. So we are supplying the complete Text Cracker program in this issue - it's not on the menu, but you'll find it if you look in the Directory.

Secondly, our sincerest apologies to Gregory Caldwell, the real author of Super Tact, which was misattributed to someone else in the last issue.



ROMantic Stories

The 1571 was an unhappy drive until it met its macho Fix ROM.

by Norman Doyle

The bugs in the 1571 are something that Commodore would rather sweep under the mouse mat, but bugs do exist and they can be fatal. £24.95 will bring you the answer to your prayers - a clean ROM which fixes all of the problems that appeared before.

1571 Fix ROM imported from California's Skyles Electric Works by Financial Systems Software is an easy to fit replacement for the ROM in the 1571. Simply remove the upper casing from the drive, gently lever out the old ROM and plug in the Fix ROM. Ten minutes and your worries are all over.

What's all the fuss about? Well, the ROM has ported across some of the nastier habits of the 1541 and, resourceful as ever, the Commodore hardware team have managed to add a few extra problems to cause concern. Remember all the dire warnings about 1541 save with replace problems corrupting programs? Well, these problems are now eradicated in the new ROM but it goes way beyond this in its usefulness.

Before the Fix ROM, the 1571 was renowned for causing various unrepeatable and inexplicable problems which were eventually tracked down to the fact that the overflow flag is not disabled when the 1571 controller was excited. The net effect is that relative files would bear no relation to the information fed in.

The Burst mode also presented problems. Locked files were total invisible to the system and could only be loaded in slow mode. Even when an awkward file was encountered the ROM wouldn't hang about to try again a second or third time and in any case the LED would stay off when the whole GCR load operation was going on. Even in MEM mode the troubles were there. The motor accelerated so slowly that frequent misreading occurred with the consequent aborting of the attempt to load anything.

Apart from hardware problems, there are also a fair number of software headaches principally relating to the double-sided nature of the drive. When a flippy disk is placed in the drive its sync pulses confuse the DOS so much that the time taken to solve this little mystery can be a real pain. You can almost hear the system thinking to itself "Oh! Yes it is... Oh! No it isn't... Oh! Yes it is..." and this pantomime goes on for ages before the DOS realises its mistake and comes back down to earth.

Even if you circumnavigate this problem by avoiding flippies (or MEM diskettes for that matter) the ROM can have fun messing up the BAM when all the buffers are allocated to various tasks. The system also has a nasty habit of rewriting the BAM image during every side one BAM allocation access.

The 1571 engineers did try their best to revise the old 1541 ROM, but changes were made which meant that some 1541 disks wouldn't work properly on the 1571 and 1541 operations would write a double zero byte to the 'double sided flag in the BAM. BLOCK NOT AVAILABLE and DEVICE NOT PRESENT errors would also crop up occasionally and even the ROM self-test omitted to check the first page of ROM memory!

I admit that it's easy to sit and snipe from the sidelines but at least someone has gone out and produced the ROM the 1571 deserves. Personally I feel that Commodore should supply one of these Fix ROMs to everyone who bought a 1571 on the argument that a bugged disk drive is not really a finished product. Unfortunately, there is a loophole in such thinking and Commodore are very good at slipping through them so it's down to the user to put up the readies for a new ROM and risk nullifying the guarantee. £25 may seem like a lot of cash for just a few fixes but can you really sleep at night without one now that you know the facts?

AT A GLANCE

Product: 1571 Fix ROM.
Price: £24.95.
Supplier: Financial Systems Software, 2nd Floor, Anbrian House, St Mary's Street, Worcester, WR1 1HA.
Tel: (0905) 611563.

Disk Dungeons

More news and views on the adventure scene
By Grontol the Mad

There is still no sign of Ultima V from the Origins/Microprose stable. Rumour has it that all the dungeon routines have been rewritten after someone at the PCW show last September demonstrated a system that was considerably better than the one already in use. We shall have to wait and see. ETA is 'sometime in the next few weeks' according to Simon Harvey of Headlines, the company that handles publicity for Microprose so you may see it in the shops shortly after this issue appears on the news-stands.

A new software house called Mandarin has signed a deal with Level 9 to release the Time and Magick trilogy. As well as the three games, Lords of Time, Red Moon and the Price of Magik, the package will also contain a 10,000 word novella. The vocabulary has been increased five fold over the original and we are promised quality pictures on the disk version. I must confess to hating the original crude graphics on Level 9 games so it will be interesting to see what they come up with this time. Scheduled release date is March 31 and Mandarin can be contacted at Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP. Phone 0625 878888.

Not everybody can afford £25 a shot for Infocom games so it is nice to see that someone is producing budget disk adventures for the Commodore 64.

Atlas Adventure Software has released three titles, all written using Incentive's Graphic Adventure Creator although only one of the games features graphics!

Black Knight is a two-part text-only game with a traditional story of good trying to overcome evil - one man against the rest of the world in a medieval setting. Barney Brown and the Chicago Connection is a spoof spy thriller; MI5 meets the Mafia. Again, the game is in two parts and this is the one with the pictures. The final title is The Case of the Mixed-up Shymer. You play Shirley Combes, secretary to the great Sherlock as you try to unravel all sorts of problems in nursery-rhyme land.

The games represent excellent value for money with the first two games costing £3.99 and £2.99. This is a realistic pricing level, especially for disk versions and everyone else producing games written on GAC or the Quill should take note.

Anybody interested should contact Mandy Rodrigues, Atlas Adventure Software, 24 Maes Y Cwm. Llandudno, Gwynedd LL30 1JE. Phone 0492 77305.

New releases

Horror is the name of the game this month with two releases from CRL. Jack The Ripper arrived amid much attendant publicity being the first game to receive an 18 certificate whereas Wolfman sneaked in through the back door as it were.

Jack the Ripper was penned by those eccentric ladies from St. Brides and comes as something as a shock to anyone used to their normal spoof type adventure.

The story is based on a series of murders that took place in the Whitechapel area of London in 1888 during which six ladies of the night were savagely attacked with no obvious motive. To this day, no one has any idea who the murderer was, despite the plethora of books arriving on the market to mark the centenary, any one writing about the events can use as much journalistic licence as they please, knowing that their theory is not likely to be any more ridiculous than the next person's. And believe me, there have been some ridiculous theories incriminating everybody from the monarchy to Russian spies, the government to followers of black magic.

The game sees you witnessing someone running away from the scene of a murder. You go to investigate the body but instead of raising the alarm, you decide to take a swing at a passing policeman and run away. You therefore have to establish your own innocence and the only way to do this is by unmasking the real culprit.

The game is written using PAW, the Professional Adventure Writing system and so is of a fairly standard construction. The action takes place in 'real time' so the action moves on if you sit thinking for too long.

Because of the nature of the story, certain events are forced upon you so that you don't always have full control over your destiny. Be prepared to restart the game frequently too as incorrect moves often lead to your early demise or arrest. The 'store' command is most useful here, allowing you to save your latest position in memory.

The text is very descriptive and gory and the more you look at it, the more you can't help but

feel that the digitised pictures of people with their throats cut have been put in purely to help fuel the publicity bandwagon. This seems especially true when you examine the packaging of the two games. Both show various screen shots of assorted mutilated bodies which could be easily interchanged. Yet one has an 18 certificate, the other none. It makes you think. (Note also, it could also be possible that Wolfman will have a certificate but details were not available at the time of going to press. It is a fair bet that it won't be 18).

'Mummy, mummy, what's a werewolf?' 'Shut up and comb your face!' Yes, lycanthropy is the name of the game in this latest tale penned by Rod Pike, author of the Pilgrim, Dracula and Frankenstein. Whereas I have enjoyed some of his earlier work, I must confess that I found Wolfman to be a terrible disappointment.

You awake from a terrible dream, only to discover that your body is covered in assorted bloodstains, none of which appear to emanate from your body. An angry mob has gathered outside your house and by listening to them, you learn that a young girl has had her throat ripped out. You soon become convinced that you are in fact a werewolf and must set out to discover all that you can about your disease. Sort yourself out properly and you will find that even a man who howls at the moon can find true love in the end.

The main fault with this game is the limited nature of its parser which is largely restricted to verb noun inputs. When this is coupled with some quirky logic, the game can become irritating in the extreme. For example, when you wake up and discover yourself to be caked in blood, it is natural to want to wash it off. 'Wash hands' works fine and you can get an additional clue if you 'examine hands' first. However, when you try to wash your face, you are told that you can't do that ... yet. Never mind, that is no doubt what the mirror is for. So you try examining face, examining mirror, examining face in mirror, look in mirror etc etc all to no avail. The actual construction required is the ugly 'look mirror'. Fair enough but most of the other constructions should have worked as well.

Again, the game is fairly linear in structure and events have to be followed in a strict order. I can see why it is necessary to some extent when following a story but a little thought can solve most problems. I don't like being told that I can't take an empty road until I have done something else first. Either let me wander about and find out later on that I need a particular object or construct specific barriers. For example, in this case, if the author doesn't want you to leave the village until a specific time, why not have the angry villagers construct road blocks at the village exits?

This forces you to stay in one group of locations until you solve a particular problem or discover a secret tunnel or whatever.

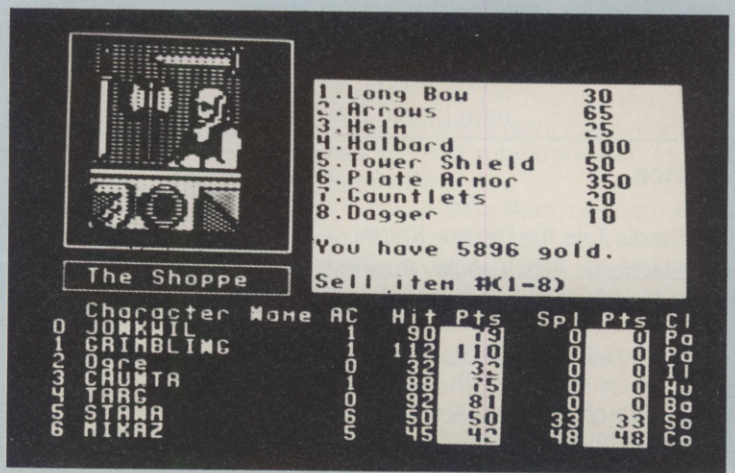
Wolfman is not destined to become one of my favourite games. Normally there is the descriptive writing of Rod Pike to enjoy but I felt that even that was not as good as usual in this game and my lasting impression was a distinct lack of atmosphere, the one ingredient most needed in a horror story.

Jack the Ripper and Wolfman are both available from CRL, CRL House, 9 Kings Yard, Carpenters Rd, London E15 2HD, 01-533 2918. Price £14.95 each. **GH**

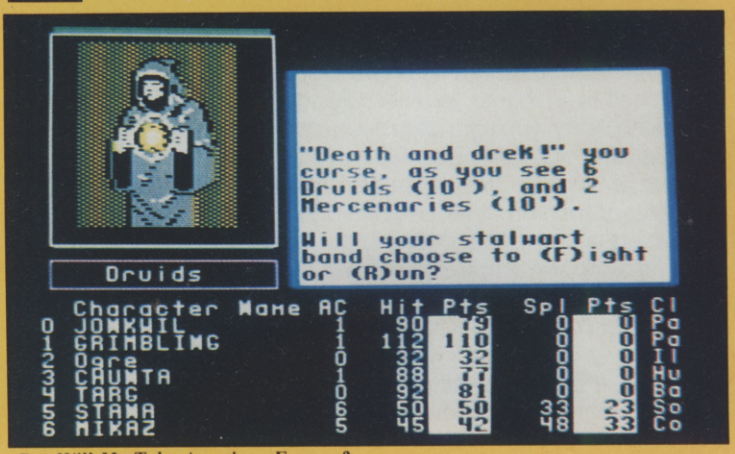
The Bards Tale. II

Death and Drek! The long twisting passage had ended with a solid wooden door in front of you. There seemed little alternative but to kick it down, but you are now beginning to doubt the wisdom of this move. A veritable army opposes you. Half a dozen wolfmen, over a score of black druids and, trying to hide at the back, a group of drens - evil sorcerors who are busy conjuring up huge, vicious wolves just as fast as their arcane powers allow them to.

You ponder on the best way to get out of this mess. You could try running away, but great heroes are made of much stronger stuff


1.Long Bow 30
2.Arrows 65
3.Helm 25
4.Halbard 100
5.Tower Shield 50
6.Plate Armor 350
7.Gauntlets 20
8.Dagger 10
You have 5896 gold.
Sell item #(1-8)
The Shoppe
Character Name AC Hit Pts Spl Pts Cl
0 JONKWIL 1 90 79 0 0 Pa
1 GRIMBLING 1 112 110 0 0 Pa
2 Ogre 1 32 32 0 0 Il
3 CAUNTA 0 88 75 0 0 Hu
4 TARG 1 92 81 0 0 Ba
5 STAWA 0 65 50 33 33 So
6 MIKAZ 5 45 42 48 48 Co

Spoiled for Choice!


"Death and drek!" you curse, as you see 6 Druids (10'), and 2 Mercenaries (10').
Will your stalwart band choose to (F)ight or (R)un?
Druids
Character Name AC Hit Pts Spl Pts Cl
0 JONKWIL 1 90 78 0 0 Pa
1 GRIMBLING 1 112 110 0 0 Pa
2 Ogre 0 32 32 0 0 Il
3 CAUNTA 1 88 77 0 0 Hu
4 TARG 0 92 81 0 0 Ba
5 STAWA 6 50 50 33 23 So
6 MIKAZ 5 45 42 48 33 Co

But Will He Take American Express?

than this, and your party is in fairly good health. Summoning up an illusionary ninja to help your cause seems like a good start. The bard can take care of the druids. One good blow on that cold horn he found should freeze the entire party of them. The drens are out of the way of even missile attack so your magic users will have to deal with them leaving your fighters to the mercy of the wolves.

The idea was fine in theory but your spells left one of the drens still alive. All your fighters have taken serious wounds from the wolves and what spell points you have are going to be needed for healing them. It looks as if you are going to have to run after all, but now that you know what the threat is, perhaps you will be better prepared next time you venture this way.

There are no prizes for guessing what Bard's Tale II is the sequel to! Electronic Art's role playing game gained a well deserved cult following and fans have been clamouring for more of the same ever since. The good news is that the game is bigger and more complex than the original with a host of new features.

Don't be put off by the title either. The game stands alone and there is no need to have played the original.

The Destiny Wand, once the uniting force in the Realm, has been stolen by the Archmage Lagoth Zanta. Broken up into seven pieces, each one hidden carefully, he hopes to dissipate its power. To save the Realm, you must discover the seven segments of the Wand and use them to defeat Lagoth.

You have a party of stalwart heroes to help in your quest, although its exact composition is up to you. Various warrior types, magic users, rogues and of course, the Bard. Nor are you restricted to human types. Dwarves, elves, gnomes and hobbits are amongst those keen for adventure, each with their own strengths and weaknesses. Who you choose is up to you. Rogues are useful for disarming traps but magic can always be used instead, so I decided to dispense with the services of one. For what it is worth, my current party consists of two paladins, a hunter, a bard and two spell casters. There is one space left in the party for any creature that wishes to join or for any monster that I summon magically.

Lawlessness is rife throughout the Realm and nearly every creature or party that you meet is likely to be hostile. A quick trip to Garth's weapon shop is essential so that your party can equip itself. Always buy the best that you can afford. You money is no use to you if you are dead!

Although warriors tend to dominate the early stages of the game, magic plays an ever increasing important role. There are five different types of spellcaster in the game. At the start, a player can only be a conjuror or a magician. As they progress, the player can either learn more spells within their own class or, when suitably qualified, learn a different profession. These are the arts of sorcery, wizardry and finally, archmagedom. Although it is tempting to change class as soon as possible, remember that once you forsake say conjuring, you can no longer go back and learn all the high powered conjuring spells.

Bard's Tale II is not without its faults. Equipping characters and buying from shops etc is messy and could be better handled. One tip here is to swap the equipment from the preset party to your own. The cold horn is a particularly useful weapon although it only has a limited number of charges. The major fault though is that you cannot save your position without returning to a Guild and then exiting completely from the game. One small niggle that mars what is otherwise an excellent and highly recommended role playing game.

GH

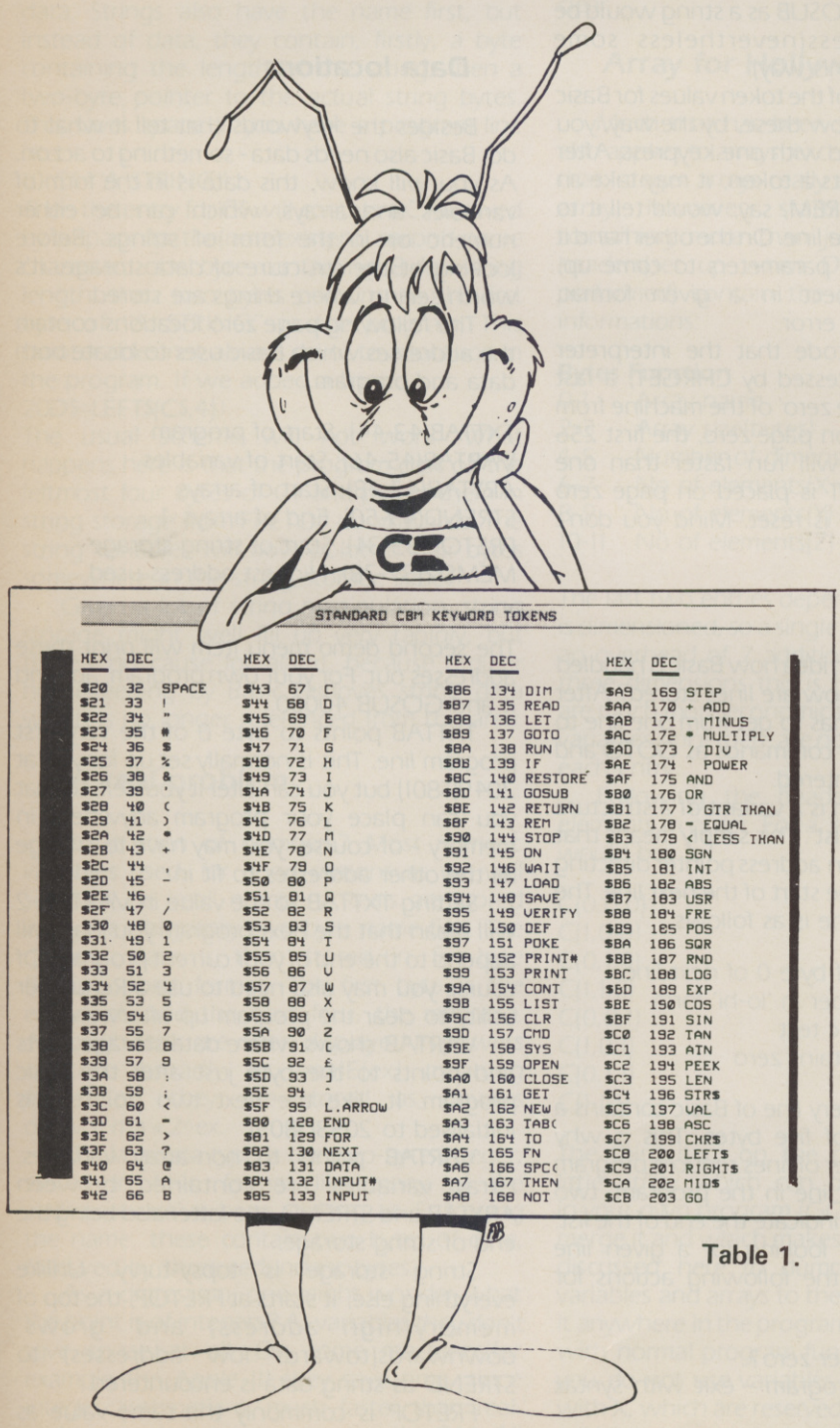
At a glance

Title: The Bard's Tale II - Destiny Knight
Supplier: Electronic Arts, Langley Business Centre, 11-49 Station Rd, Langley, Nr Slough, Berks SL3 7YN. **Tel:** (0753) 49442
Price: TBA
Graphics: 3-D views of your surroundings
Sounds: Depends on what tune you tell the bard to play
Playability: Loss of early characters can be frustrating
Addictiveness: Smack up a few monsters and you will soon be hooked

Inside Basic

If you've ever wondered just what goes on when a Basic program is run, here's your chance to find out.

By Fin Fahey



STANDARD CBM KEYWORD TOKENS

HEX	DEC		HEX	DEC		HEX	DEC		HEX	DEC	
$20	32	SPACE	$43	67	C	$86	134	DIM	$A9	169	STEP
$21	33	!	$44	68	D	$87	135	READ	$AA	170	+ ADD
$22	34	"	$45	69	E	$88	136	LET	$AB	171	- MINUS
$23	35	#	$46	70	F	$89	137	GOTO	$AC	172	* MULTIPLY
$24	36	$	$47	71	G	$8A	138	RUN	$AD	173	/ DIV
$25	37	%	$48	72	H	$8B	139	IF	$AE	174	^ POWER
$26	38	&	$49	73	I	$8C	140	RESTORE	$AF	175	AND
$27	39	'	$4A	74	J	$8D	141	GOSUB	$B0	176	OR
$28	40	(	$4B	75	K	$8E	142	RETURN	$B1	177	> GTR THAN
$29	41	)	$4C	76	L	$8F	143	REM	$B2	178	= EQUAL
$2A	42	*	$4D	77	M	$90	144	STOP	$B3	179	< LESS THAN
$2B	43	+	$4E	78	N	$91	145	ON	$B4	180	SGN
$2C	44	,	$4F	79	O	$92	146	WAIT	$B5	181	INT
$2D	45	-	$50	80	P	$93	147	LOAD	$B6	182	ABS
$2E	46	.	$51	81	Q	$94	148	SAVE	$B7	183	USR
$2F	47	/	$52	82	R	$95	149	VERIFY	$B8	184	FRE
$30	48	0	$53	83	S	$96	150	DEF	$B9	185	POS
$31	49	1	$54	84	T	$97	151	POKE	$BA	186	SQR
$32	50	2	$55	85	U	$98	152	PRINT#	$BB	187	RND
$33	51	3	$56	86	V	$99	153	PRINT	$BC	188	LOG
$34	52	4	$57	87	W	$9A	154	CONT	$BD	189	EXP
$35	53	5	$58	88	X	$9B	155	LIST	$BE	190	COS
$36	54	6	$59	89	Y	$9C	156	CLR	$BF	191	SIN
$37	55	7	$5A	90	Z	$9D	157	CMD	$C0	192	TAN
$38	56	8	$5B	91	[	$9E	158	SYS	$C1	193	ATN
$39	57	9	$5C	92	£	$9F	159	OPEN	$C2	194	PEEK
$3A	58	:	$5D	93	]	$A0	160	CLOSE	$C3	195	LEN
$3B	59	;	$5E	94	↑	$A1	161	GET	$C4	196	STR$
$3C	60	<	$5F	95	L.ARROW	$A2	162	NEW	$C5	197	VAL
$3D	61	=	$80	128	END	$A3	163	TAB(	$C6	198	ASC
$3E	62	>	$81	129	FOR	$A4	164	TO	$C7	199	CHR$
$3F	63	?	$82	130	NEXT	$A5	165	FN	$C8	200	LEFT$
$40	64	@	$83	131	DATA	$A6	166	SPC(	$C9	201	RIGHT$
$41	65	A	$84	132	INPUT#	$A7	167	THEN	$CA	202	MID$
$42	66	B	$85	133	INPUT	$A8	168	NOT	$CB	203	GO

Table 1.

It's strange, really, that the C64 should be such a popular machine, considering how lacking C64 Basic is in features that most users would take for granted, such as hi-res and sound commands. Well, it was written extremely fast.

The apocryphal story goes that the programming team responsible were in a state of despair - the C64 was almost on the eve of release, just in time for the Christmas season, and the interpreter they were working on was still, as it had been for the past three months, only 95 per cent complete. In strode irascible Commodore MD Jack Tramiel, now of Atari fame. "Gimme me an interpreter," growled Jack, "or tonight you sleep with the fishes."

Freshly inspired with this powerful new incentive, the team came up with C64 Basic, and, oddly, the machine prospered, in spite of the limitations of the language. In fact, there is a theory that it did so because the Basic was so bad - the machine attracted machine code programmers in waves, resulting in some remarkably fine software.

But C64 Basic is still there, and no matter how far into machine code a programmer is, they will find themself using it for something sooner or later. At the very least, it's a quick and dirty way of setting up data files. It's worthwhile, therefore, to take a look at how Basic works.

Tokens

It's often said that the difference between a compiler and an interpreter is that the former converts a whole high-level language program to machine code all at once, while an interpreter does it one line at a time. In fact this is not really functionally accurate, although it's a good way of showing the difference. The C64 interpreter really looks at a Basic program as a series of subroutine calls to the Basic and Kernal Roms.

The 8k Basic Rom runs from address 40960 to 49151 while 8k of Kernal code, which contains such things as I/O and interrupt routines, is placed at 57344. It's not a lot, 16k of 'firmware'. Alert readers may notice that there is a gap of 8k between the Roms. This constitutes the Ram which is difficult to use from Basic, and which would have been part of a more advanced interpreter, had that been written.

Central to the way in which the programs are interpreted is the 'token'. All Basic keywords, representing both functions and commands such as GOTO, REM or SIN, are converted into tokens when you enter them into the machine. A token is just one byte long, so the use of these saves space. More importantly, tokens also save time. The interpreter only has to hit one such byte to know that it should now either do something or wait for parameters. Interpreting, say, GOSUB as a string would be a clumsy business(nevertheless some interpreters work this way).

You'll find a list of the token values for Basic in Table 1. If you know these, by the way, you can enter a keyword with one keypress. After the interpreter meets a token, it may take an immediate action - REM, say, would tell it to ignore the rest of the line. On the other hand it may now wait for parameters to come up, which it will expect in a given format. Otherwise - syntax error.

Each byte of code that the interpreter handles is pre-processed by CHRGET, a fast subroutine on 'page zero' of the machine from 115-138. A routine on page zero, the first 256 bytes of memory, will run faster than one elsewhere. CHRGET is placed on page zero when the machine is reset. Mind you don't corrupt it.

Line format

We have a rough idea how Basic is handled within a line, but how are lines stored? After all, the interpreter has to get from one line to another when such commands as GOTO and GOSUB are encountered.

A Basic program is a variant of a structure known as a 'linked list'. This simply means that each line contains an address pointer directing the interpreter to the start of the next line. The full format of the line is as follows:

Byte 0,1: Address of byte 0 of next line
Byte 2,3: Line number in 'lo-hi' form
Byte 4 to (n-1): Basic text
Byte n: Always contains zero

We can see that every line of Basic contains a hidden overhead of five bytes. This is why reducing the number of lines reduces program size. After the last line in the program, two zeros are placed to indicate the end of the list. So the interpreter, looking for a given line number, performs the following actions for each line:

1. Is next line pointer zero?
2. If yes, end of program - exit with syntax error.
3. Is line number target line number?
4. If yes, exit to pass on line address.
5. If no, change search address to next line pointer and go to 1.

The earlier that a line occurs in Basic, the quicker it is found. This is why infrequently called routines should be at the end of a program, and common ones at the start.

The first menu option on the demo program on the disk illustrates all this by printing a list of Basic line numbers and their addresses. It's simple to remove the routine from the demo, attach it to your own program and call it by GOSUB 20000.

Data locations

Besides the keywords that tell it what to do, Basic also needs data - something to act on. As you will know, this data is in the form of variables and arrays, which can be either numeric or in the form of strings. Before looking at the structure of data storage, it's worth seeing where things are stored.

The following page zero locations contain the addresses which Basic uses to locate both data and program.

TXTTAB(43-44): Start of program
VARTAB(45-46): Start of variables
ARYTAB(47-48): Start of arrays
STREND(49-50): End of arrays +1
FRETOP(33-34): Start of string storage
MEMSIZ(37-38): Highest address used

The second demo menu item will print these addresses out. For your own program, append it and GOSUB 40000.

TXTTAB points to byte 0 of the very first program line. This is normally set up for you at 2049(\$801) but you can alter it yourself, so that you can place your program anywhere in memory - of course, you may have to change all the other addresses to fit in.

Setting TXTTAB to the value in VARTAB-2 will mean that the next program you load will append to the end of your current program. Of course you may also need to use a Renumber utility to clear the program up afterwards.

VARTAB shows where data storage starts and points to the byte just after the Basic program. It, like the next two pointers, is initialised to 2053(\$805).

VARTAB points to non-array variables. Array variables are contained between ARYTAB and STREND, the latter also being the end of string storage.

String storage is topsy-turvy. Unlike everything else, it starts at FRETOP, the top of memory(high address) and 'grows' downwards(towards low addresses) to STREND as string data is encountered.

FRETOP is commonly the same value as MEMSIZ, the highest address your program can use. If you want to reserve space in memory, so that Basic won't overwrite it, reset MEMSIZ and FRETOP to lower values.

Data types

Within these limits, data is stored in a number of different ways. Besides being single variables and arrays, a data item can be one of three things: a string; a real('floating-point') number, or an integer. In the program strings are suffixed by '$' and integers by '%'.

Numeric variables are stored with their two-byte name first, followed by the numeric data. Strings also have the name first, but instead of data, they contain, firstly, a byte containing the length of the string, then a two-byte pointer to the actual string bytes. This saves space. If you have a program line like:

10 C$ "A STRING"

Then the entry for C$ will contain a C followed by a space for the(non-existent) second name character, one byte containing 8 for string length, then two bytes pointing to the first byte of "A STRING" in the program. This pointer does not always point to a location in the program. If we added a line:

20D$=LEFT$(C$,4)

The usual scheme will not work. What happens here is that the program clips off the leftmost four bytes of C$ and places them in string storage from FRETOP downwards. The string variables will now point to four bytes somewhere in the string storage space.

Given a lot of string manipulation, string storage might well fill up very rapidly, but there's no cause for alarm, because regular housekeeping by Basic removes string data which is no longer referenced from this area.

A real problem

What then of numbers? Most numeric variables used, for good reasons as we will see, will be 'real' numbers. Reals are stored with the obligatory two-byte name first. The numeric data is then stored in five-byte floating point format. The first byte is the exponent, and the next four, the mantissa. Although reals are often displayed in powers of ten, broadly as (ma)E(ex) meaning ma*10^ex, they are stored as powers of two: ma*2^ex.

The last data type is the two-byte integer, stored in hi-lo format like many of the addresses we've been looking at. Following the name, these contain two bytes of data, followed by three redundant bytes.

As a digression, one might wonder what the point is of integers? As variables they don't save space at all. On some machines(for example the Apple II) they save time, since integer arithmetic is much faster than real. Unfortunately this is not true on the C64. All arithmetic is real, and in fact integers are slightly slower because they have to be converted to reals first!

In fact integers are useful in arrays, where each integer array element occupies 2 bytes of space, just as it should. But don't bother using them as variables - they don't help.

Finally, how does the program know that the upcoming data is string, real, or integer? The answer is in the name. Both bytes of integer names have their seventh bit set to 1, while for strings only the second byte is treated this way, while for reals both bits are clear.

Array for Hollywood!

Much that has been said about variables also applies to arrays, except, as we have seen, that integer arrays really do save space. Each array, however, starts with a header containing more than just an name. Array headers(set up when DIM statements are performed) contain the following range of informations:

Bytes	Function
0-1	Array name
2-3	Array size(bytes)
4-5	Number of dimensions(1-3)
6-7	No of elements(X dimension)
8-9	No of elements(Y) - optional
10-11	No of elements(Z) - optional

The last two entries depend on how the array is dimensioned, so a single dimension array has an overhead of 7 additional bytes, while for three dimensions this is 11. In general, arrays are much more economical on overheads than variables since there are no additional bytes for each entry.

Following the header come the array elements in order. For a 3-d array C(1,1,1), this would be:

C(0,0,0)
C(1,0,0)
C(0,1,0)
C(1,1,0)
C(0,0,1)
C(1,0,1)
C(0,1,1)
C(1,1,1)

The third item on the program menu is a little utility which can be called anywhere in your own program (GOSUB 600000) if you merge it and which makes use of the principles discussed here to dump the values of all variables and arrays to the screen. You can call it anywhere in the program. It will not interfere with normal program functioning, as long as you do not use variables and strings starting with X, which are reserved for the routine itself.

We've covered a lot of ground in this brief tutorial. Perhaps in a future instalment we'll look into using interpreter's Basic routines directly.

The height of resolution

Most C64 programs use either character graphics or multi-colour high-resolution mode. Yet standard hi-res has much to offer.

By Gordon Davis

Almost all C64 programs steer well clear of using high resolution graphics. Programmers have found it straightforward to construct complex compound bit-maps out of the smaller maps of the character set. Add a few sprites to wander around the smooth-scrolling character background, and lo! A game is born.

Yet this concentration on character graphics is not inevitable. It certainly doesn't happen on other machines. One of the reasons it does is because the Basic Rom doesn't contain any routines which can be used to manipulate hi-res graphics and programmers can't be bothered to write them. Another reason is that hi-res can be extremely slow.

It needn't be, as shown by Microprose's flight simulators, Novagen's Mercenary, or the incomparable Elite, just to name a few.

A question of choice

There are two hi-res modes available on the C64, multicolour and standard. We shall concentrate on standard for the moment, firstly because it is less complex, secondly because it has virtues in its own right, offering a screen of an impressive 320 x 200 pixels as against multicolour's 160 x 200. Since all pixels are double width in multicolour, further efforts have to be made to maintain the right proportions when drawing. Against this must be set the limited colour capability in standard hi-res, but you can't have everything.

As we have mentioned, a standard hi-res screen consists of 64000 pixels (picture elements) arranged as 320 across and 200 down. Each pixel corresponds to one bit on the hi-res memory map, which can be in various places in memory. This map must therefore occupy 64000/8 bytes or roughly 8k, so you have to be careful where to put it.

Colour information for standard hi-res is held, not on the usual text colour map, but on what is usually the screen in character mode, i.e. the 1000 bytes of memory running from address 1024 to 2023 (although you can move it elsewhere).

Each colour byte corresponds to a block of screen of eight bytes - eight pixels by eight, which, of course, just happens to be the size of one character in normal text mode. The upper four bits of the colour byte determine the foreground colour in this area, i.e. the colour of any bit set to a 1, while the lower four similarly set the background colour (any bit set to zero). The value held in each nibble(1-15) comes from the usual C64 colour table, of course.

Getting it clear

The most important things to do, are to turn on hi-res, and to clear down the screen and colour map. To turn on standard hi-res you set Bit 5 of the VIC control register at 53265. In Basic this is:

```
20 POKE 53265, PEEK(53265)OR 32
```

You may also want to move the screen in memory, but we'll put it at location 8192 for the moment by setting Bit 3 of the memory control register:

```
10 POKE 53272, PEEK(53272)OR 8
```

Clearing the memory maps, of course, is really simple from Basic, but...

```
30 FOR N 8192 TO 8192 + 7999:POKE N,0:NEXT N:REM CLEAR SCREEN
40 FOR N 1024 to 1024 + 999:POKE N,1:NEXT N:REM CLEAR COLOUR TO BLACK AND WHITE
```

... slow, ain't it? At this point, you either give up or take up machine code. A number of routines to help you have been provided on the disk. If you select HIRES on the menu, these will be installed at address 49152($C000). A jump table is provided at the start of the routines. A number of page-zero locations are used for parameters. The first four routines are:

INITHI(49152): This first routine, accessed by SYS 49152, turns on hires mode, clears the screen at 8192 and clears the colour map to the value placed in location 2.

INITTXT(49155): Returns to text mode and clears screen.

HICLR(49158): This clears the hires screen. Location 2 should be a 1 to clear to foreground colour or a 0 to background. In fact this routine will clear it to any bit pattern set in location 2.

COLCLR(49161): This clears the colour map to the value set in location 2.

In fact, I haven't been completely honest. INITHI does something else too, and to explain what, we'll have to look at addressing the hi-res screen.

Addressing the problem

Another intimidating thing about high-resolution is that the screen bytes do not occur in order. Each sequential group of eight bytes makes up one character area, i.e. going from one to the next we move 8 pixels down the screen Y axis. The next byte takes us to the next character area along the X axis, which means that we move one byte to the right but 8 pixels back again, taking us right back to the start. So it goes across the 320 bytes making up a screen 'text' line, and when the end of the line is reached we drop down to the next one.

This is ideal for plotting characters, but how do we address a point with coordinates X,Y?(Assuming the screen origin is at top left). Remember that we are looking for a given bit in a given byte. In brief, the byte is given in Basic as:

```
BYTE 8192 INT(Y/8)*320 INT(X/8)*8 YAND7
```

and the number of the bit in that is:

```
BIT 7-(XAND7)
```

You can figure out why for yourself. It's clearly a job for machine code, but, you may think, if we have to do that for every single damn point, won't hi-res still be slow? Yes, but you wouldn't know it from most books and manuals. There is an alternative, and INITHI has already implemented it. Supposing that we could go straight to the right line of hi-res bytes, i.e. the right Y coordinate? Then we only have to handle the X value. We can do this - INITHI sets up an index of addresses to the 200 screen lines. The low bytes of each address go from address 7792 to 7991 and the high bytes from 7992 to 8191. For the loss of 400 bytes, we have really souped up the speed. But beware of overwriting the index.

The byte address is now given by (Index address(Y)) X/8 and the bit by X-INT(X/8) in Basic terms. A division by eight is very fast in assembler, and the next routines make use of it.

HIPLOT(49164): Plot/unplots a hires point. Since X can run up to 320 it is contained in two bytes: 251(low) and 252(high). 253 contains Y and the point is plotted if location 254 is set to 1 or unplotted if this is set to zero.

COLSET(49167): Sets the colour map byte corresponding to the hires coordinates in 251-253 to the value set in location 2. Note that this may affect surrounding bytes.

COLPLOT(49170): Performs the same functions as HIPLOT and COLSET combined in one subroutine.

That's it for this issue, but we've got started. In the next article in this series, we'll be looking at how to put text on a high-resolution screen, and considering the theory behind line drawing, among other things.

Strategic studies

Australia's Strategic Studies Group has launched its spring offensive on the UK Market. Will SSG become the Infocom of wargames?

By Tony Hetherington

Wargamers who want to fight the great battles of history either with, or against, their computer have been restricted to either the PSS range of home-grown games or American imports from SSI and a few from Microprose. Now there is a new player as Australia's SSG are set to invade Britain.

Although Australia and Australians have featured heavily in the news thanks to the bicentenary celebrations earlier this year, only Melbourne House is widely recognised as Australia's contribution to software, SSG has been producing wargames for over two years now, distributed by Electronic Arts in the US. Now SSG has set up a UK office in Chipstead, Surrey, so the invasion is on.

SSG's two latest releases, Halls of Montezuma and Decisive Battles of the American Civil War (Volume 1) arrived in the Commodore Disk User office without any fanfare. After some extensive research and several days locked in conflicts, ranging from the war on the Eastern Front to interstellar war, here is a guide to SSG, eight of its games, its planned 1988 releases and Run 5, SSG's own magazine.

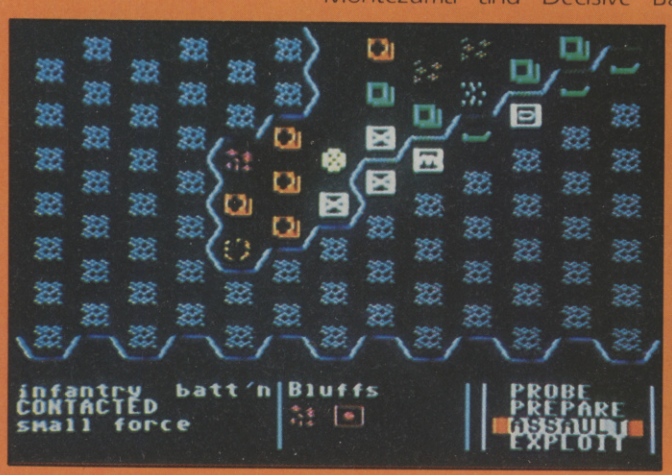
Avid wargamers

Strategic Studies Group (SSG from now on) is run by two avid wargamers, Ian Trout and Roger Keating, who also design and program most of the games. According to SSG UK, they both started out as board-and-figure wargamers and then moved into computers. This is obvious from the quality, depth and playability of the games and the enthusiasm that comes across in the support material.

The first thing that impresses you about an SSG game is the packaging. Each game is supplied in a cardboard album that includes a full instruction manual, cards with summaries of the game menus, full colour maps covering the games scenarios, so you can match the screen display with the whole battlefield, and a strip of five disk labels for your save game disks.

The manual contains full historical details of each game scenario, a guide to the game mechanics and even a step by step tutorial which takes you through the first turns of a game.

Once loaded, all SSG games follow similar game mechanics except some games have improved or adapted the basic system. Each offers you the opportunity to assign the various command roles to human or computer



Halls of Montezuma

Decisive Battles

opponents. In all games you play the Commander-in-chief (whatever rank that entails), but some subordinate roles of battalion commanders can also be assigned which allows you to climb out of your lofty seat of command and step into the mud of the battle. Obviously, these other roles can also be given to other human players, making some SSG games ideal for club playing.

Each game is also controlled through a series of nested menus that guide you step by step through assessing the battle situation, assigning resources and issuing orders.

Once you have issued your orders your subordinate commanders carry them out - in most games this means the computer - which leaves you to watch the actual unit counters move across the map and the ensuing combat reports. This seems odd at first, especially if you're used to other wargames, where you move each and every unit counter across every single map hex. SSG's approach, however, allows you to concentrate on the strategy and leaves the fighting to the computer soldiers.

Your success or failure as a commander is determined by a comparison of victory point totals at the end of the game. Victory points are gained by taking and holding historical objectives such as towns, hills and airfields and points are awarded for each turn you retain possession with a bonus at the end of the game. A handicap system allows you to give yourself or your opponent a slight, minor or major advantage, which increases the victory points for each target accordingly so even a novice or incompetent General can enjoy the taste of victory.

In modern warfare scenarios you can also assign air strike and naval gun support points to help to take an important objective such as establishing a beach head.

Halls of Montezuma also contains Warplan, a wargame construction set to devise new battles for the marines, and Warpaint, to customise the appearances of the icons and terrain symbols.

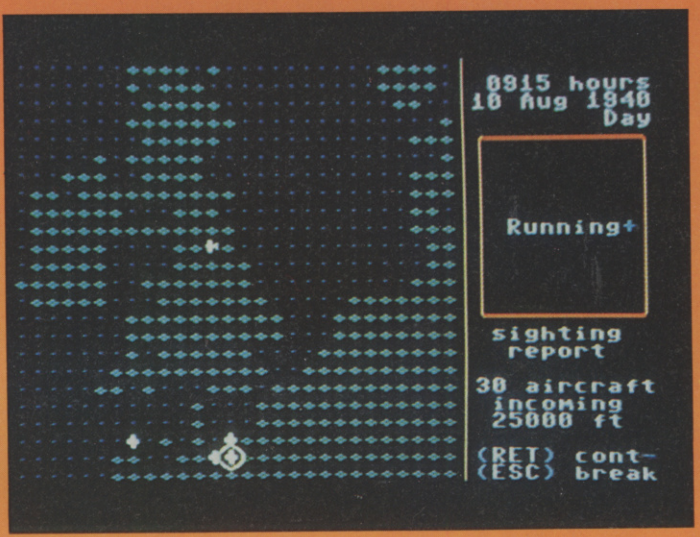
A nation divided

Decisive Battles of the American Civil War simulates the unique problems posed for Civil war generals. Once again, menus guide you through the issuing of orders and establishing objectives, which are carried out by your computer subordinates. There's also Warpaint and Warplan to customise the action, should you tire of fighting the First Bull Run, Shiloh, Second Bull Run, Antietam, Fredericksburg and Chancellorsville.

In Decisive Battles you as the Commander have a more dramatic effect on your men - you can even get wounded or killed. You can decide on each game turn whether you will be cautious, sensible, bold or heroic for the next hour. Heroism will inspire the men around you to great things but subject you to greater risks, whereas a cautious leader may make the men wish they were on the other side!

Decisive Battles can be customised to suit your tastes from a basic conflict on an open battlefield to a tense realistic struggle, where you can only see those enemy units spotted by your troops and lack of radio means you only have limited control over your own men. You can add to the challenge more by enhancing your computer opponent's strength and leadership abilities.

The combat system also reflects the importance of formations on the battlefield, as attacks by artillery and men on a unit will not only kill its men but also reduce its cohesion until it fragments and is routed.



Europe Ablaze

Battlefront

Battlefront is the name of the game and the system that was enhanced slightly to produce Halls of Montezuma and it contains four land battles from World War II and a game design kit that's a cut-down of Warplan.

The four scenarios included on the disk are Crete 1941, Stalingrad 1941, Saipan 1944 and Bastogne 1944-45 and feature a range of units including foot, motorised and mechanised infantry, armour, anti tank, artillery, engineer, parachute and marines.

The allocation and use of air and naval support can be decisive in Battlefront games as can using the weather, air superiority, roads, cities, and unit strength, fatigue and experience to your advantage.

Battle in Normandy is the sequel to Battlefront and includes eight scenarios that relive the momentous battles that established the Normandy Bridgehead.

Russia is an enormous game that sets out to recreate the entire Russian front during the German invasion in World War II.

Four games are included on the game disk. The campaign game covers the entire conflict

▶ ▶ ▶ ▶ ▶ ▶ ▶

from June 1941 until a conclusion which could take until 1947! Since each turn represents one week you'll need the save game disk labels and a lot of time or if you can't handle that you could try one of the shorter 31 turn scenarios that cover the initial drive to capture Leningrad in 1941, the attempt to capture Stalingrad and counterattack in 1942 and its aftermath in Kursk in 1943.

Russia is not a game for the faint-hearted and can get quite complex, as you plan your advance into the Russians heartland. Hitler's troops were halted just a few miles from Moscow after four years due to a combination of bad weather, bad judgement and bad luck. Will you fare any better against resolute resistance, difficult supply lines and the approaching Russian winter?

You can take the role of the Russian or German supreme commanders and deal out the lesser Korps commander jobs to yourself, other human or computer players. Then issue your orders as you execute your master plan, but remember, how well your men execute your orders is a test of how well you have commanded them.

London's burning

Europe Ablaze takes the wargame to the skies in three scenarios that show the changing fortunes of war. At first the game is set around Britain, as the Luftwaffe launch wave after wave of bombing raids, and then Britain becomes the base for two further scenarios as British and American bombing strikes at the heart of the German war machine.

Each side has three vacancies, from Commander-in-Chief downwards, that can be filled by human or computer players. In its most basic form you play the C-in-C and must manage your available bombers, fighter aircraft and flak guns to either launch or repel a succession of bombing raids. Your success or failure is then measured by the damage done or prevented by your aircraft.

The C-in-C also sets criteria for his junior air commanders, which means they must fight and manage their squadrons as best they can with the limited resources they are given. Limited isn't the word for this game as it includes details for 24 aircraft types, 255 squadrons, 127 airbases, 63 population centres or cities, 63 radar stations, 63 shipping lanes and 63 flak units!

Up to 12 players can take part in a game of **Carrier at War**! Taking the role of land-based or naval commanders the players will fight the major battles of the Pacific War. Midway, Eastern Solomons, Philippine Sea, Santa Cruz and Coral Sea - they're all there - and you can even launch an attack on Pearl Harbour to learn the game system.

Each scenario has a briefing and order of battle for both sides which sets the scene, and assigns duties to the players who will have warships, aircraft and land forces at their control.

Per ardua ad astra

Reach the Stars turns the wargamer into a galactic emperor. Starting from a home planet with limited population, industry, social and defence levels, you must manage your resources to build ships to explore and colonise the galaxy.

During a turn you can build explorers and send them out into the galaxy to search for new worlds, while spending any remaining resources on improving your existing empire and building starships to protect it.

Three other computer - or human - controlled players prove that the galaxy can become crowded, as empires clash in galactic war. Combat occurs whenever ships from opposing players reach the same system and although combat is automatic the computer displays a status report so you can see how you're doing, and decide whether to pull out. But in space there is nowhere to hide. As the game continues, the players will develop stronger starships to stretch their empires, destroying all in their path. Only your skill and starships can stop them.

SSG follows up the games with issues of **RUN 5**, its own magazine, which contains details for new scenarios for these games that can be created using the game creating utilities, such as Warplan, as well as hints, tips and news of future games. The magazine is available either separately or together with a disk containing the new scenarios.

Future releases for 1988 include Decisive Battles of the American Civil War - Volume 2, Rommel's Battles in North Africa and an as yet unnamed fantasy title. Details of these and copies of the games mentioned here are available from SSG UK, Court House, 15 Court Hill, Chipstead, Surrey, CR3 3NQ (Tel: 07375 53600). The games are a little pricey at £29.95 each but you do undoubtebly get value for money - one game taking months to exhaust, particularly if you subscribe to RUN 5 (also from the above address) for £2.95 each, or £11.00 for four issues. The magazine tops up the interest and challenges you with new scenarios.

Although you can pick up and play a SSG game in a few minutes, it takes a lot longer to master them. Only then do you realise their full potential particularly when they are played between human opponents. It is the depth, accuracy and playability of the games together with the superb packaging that will earn SSG the reputation as being the Infocom of wargaming.

Disks up for grabs

This month's competition may well get you all the disks you can eat... er (...) or whatever you lot out there do with them

For this issue's competition, we're offering you lucky people the chance to win disks - lots of them. The first ten people to get the answer to our spot the difference competition right will each receive 25 disks. All your program storage problems could be solved.

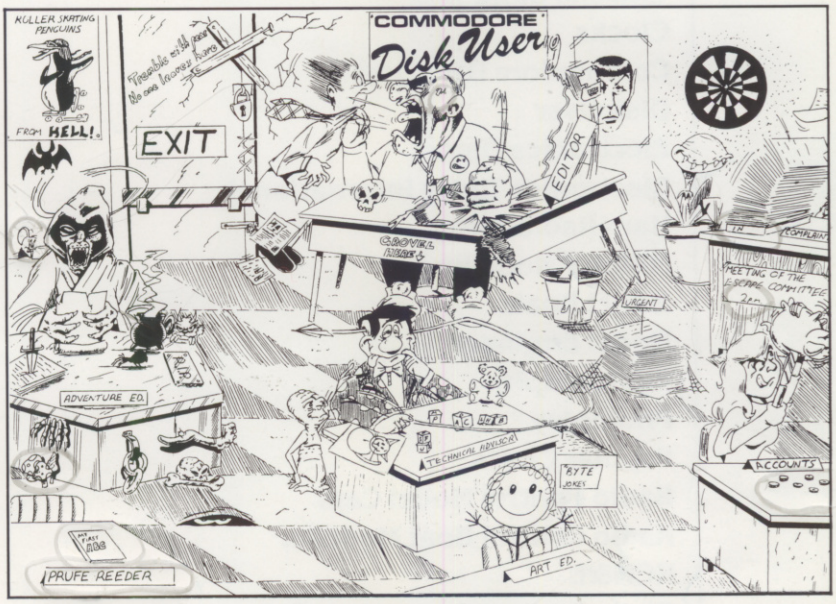
How to Enter

Study the two cartoons, which, as you may notice, depict the CDU editorial office with a frightening degree of accuracy. Once you have decided how many differences there are between the two, complete the entry coupon and send it to the editorial address (see below). Please write the number of differences that you have found on the back of the envelope. If you don't, then your entry will not be accepted.

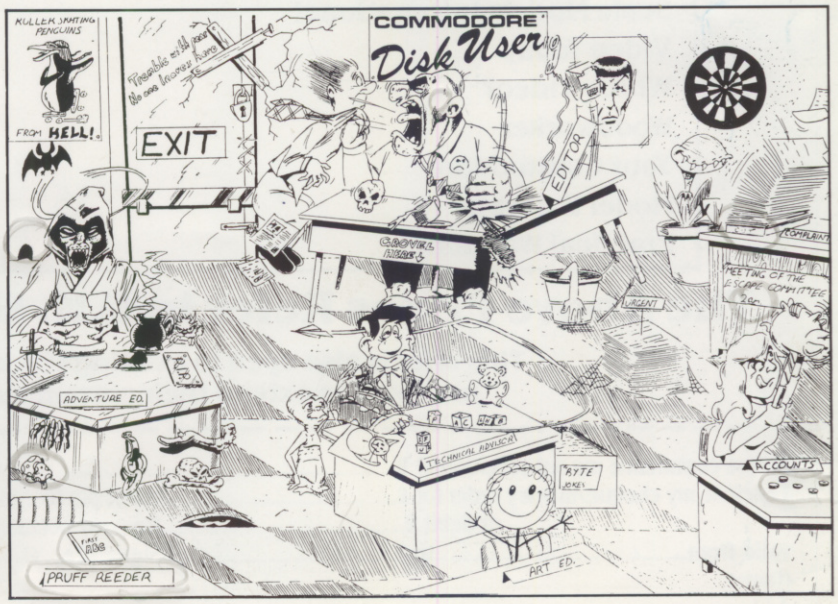
The Rules

Entries will not be accepted from employees of Argus Specialist Publications. This restriction also applies to employees' families and agents of the company.

The How to Enter section forms part of the rules. The editor's decision is final and no correspondence will be entered into.



SPOT THE DIFFERENCE COMPETITION



Disks Competition Entry Coupon

Name .....
Address .....
.....
.....
Postcode .....
Number of differences found .....

Post to: Commodore Disk User, Disk Competition, 1 Golden Square, London W1R 3AB. Closing date: Friday, 24th June 1988.

SUBSCRIPTIONS SENSATIONS!

AT COVER PRICE ONLY!

Any of the magazines from the list below can be delivered to your door with : NO handling charge NO postage costs

A&B Computing	£18.00
Aeromodeller	£22.20
Citizens Band	£16.20
Clocks	£27.00
Commodore Disk User	£15.00
Disk User	£17.70
Electronics Digest	£11.00
Electronics Today International	£16.80
Ham Radio Today	£15.60
Military Modelling	£15.60
Model Boats	£15.60
Model Engineer	£26.40
Photography	
Photoplay	
Popular Crafts	£16.20
Radio Control Model Cars	£16.20
Radio Control Boat Modeller	£7.50
RCM&E	£14.40
Radio Control Scale Aircraft Quarterly	£9.00
Radio Modeller	£14.40
Sea Classic International	£11.70
Scale Models International	£15.00
Video Today	£15.00
Which Video?	£15.00
Woodworker	£15.60
Your Commodore	£14.40
Model Railways	£13.20
Practical Wargamer	£7.80

The Above Prices Refer to U.K. Subscriptions Only

This offer is also open to existing U.K. subscribers who may wish to extend their current subscriptions.

Please commence my subscription(s) To.....with the.....Issue
I enclose my cheque/money order for £.....made payable to Argus Specialist Publications Ltd.
or debit £.....from my Access/Barclaycard No. | | | | | | | | | | | | | | | |
valid from.....to.....Signature.....
Name.....
Address.....
.....

Access

Send this form with your remittance to:
INFONET LTD. (N.R.S. 88) 5 River Park Estate, Berkhamsted, Herts. HP4 1HL.

VISA